

# TEXT-BOOK ON DIRECTIONAL CALCULATIONS

SYSTEMATISED BY COMPREHENSIVE, EXHAUSTIVE  
AND UNIVERSAL RULES,  
WITH  
PRECISE AND COPIOUS TABLES

BY

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Houses" and "Hindu Astrological Calculations (Modernised)".



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## FOREWORD

No book treats the subject in a **comprehensive** and **exhaustive** manner giving the rules of **universal** application to be adopted in the several stages of the different Directional Calculations, though Directions are pre-eminent for judging nativities. In this book I have endeavoured to do so, and, therefore, to render all Directional Calculations **lucid**. It is for the reader to judge how far I have succeeded in my attempt.

I have raised certain questions in regard to some kinds of Directions, such as Converse Directions of all kinds, Primary Mundane Directions to the Horizon, Primary Zodiacal Directions, and Directions of the Angles. I trust the reader will agree with me in my **contentions**.

To complete my "Century Tables of Houses", its Part IV for latitudes  $61^{\circ}$  to  $66^{\circ} 33'$  is already being printed and is expected to be published before the current year ends. The Essentials of Hindu Judicial Astrology is also in the Press, and it may be published even earlier.

140, BROADWAY,  
MADRAS,  
20th September 1933

M VIJAYA RAGHAVULU

# CONTENTS

## LESSON I—INTRODUCTION

ARTICLE	PAGE
1 The Standard Nativity	1
2 The Zodiacal Positions of Bodies	1
3 The Zodiacal Positions of the Cusps of Houses	1
4 Zodiacal Map	2
5 The Mundane Positions of Bodies	2
6 Combined Mundane Map	3
7 Speculum	3
8 Zodiacal and Mundane Aspects	5
9 Directions	6
10 The Five Elements of a Direction	6
11 Classifications of Directions	6
12 Notation of Directions	7
13 The Rules are Comprehensive, Exhaustive and Universal	8
14 Measurement of Time	8
15 Reverse and Opposite Directions	8
16 Admissibility of Converse Directions	9

### PART I—Primary Directions

17 Primary Directions	11
-----------------------	----

## LESSON II—PRIMARY MUNDANE DIRECTIONS

18 Primary Mundane Directions	12
19 The Clockwise and Anti clockwise Distances from D B to S P	12
20 The Shorter Distance between D B and S P	14
21 The Increasing and Decreasing Series of Aspects of Directions	15
22 The Scale of the Aspects of Directions	16
23 The Arcs of Directions	17
24 The Moderation of A D on D B crossing its Horizon	17
25 Directions to the Angles	19
26 Determination of the A D s in a Series of Primary Mundane Directions	20
27 Determination of the A D of a Body directed to a given Aspect	30
28 Determination of the Mundane Aspect of a given A D	33
29 Relation between the Primary Mundane Directions to the Meridian and those to the Horizon	36

### LESSON III—MUNDANE PARALLELS

30	Mundane Parallels	
31.	The Different Types of Mundane Parallels	37
32	Primary Directions to Mundane Parallels	37
33	The Meridional Half of Parallel	38
34	The Meridional Distance of D B	38
35	Moderation of the Meridional Distance of the S P	38
36	The Arc of Direction	39
37	Determination of A D's of the Mundane Parallels of all bodies to the different S P's	40

### LESSON IV—RAPT PARALLELS

38	Rapt Parallels	46
39	The Direct Body and the Passive Body	47
40	The Arc of Parallel	47
41	The Meridional Half of Parallel	47
42	The First M D. of D B	48
43	The Second M D of D B	48
44	The Arc of Direction	49
45	Determination of all Rapt Parallels	49

### LESSON V—PRIMARY ZODIACAL DIRECTIONS

46	Primary Zodiacal Directions	51
47	Primary Zodiacal Directions of the Angles and to the Bodies	54
48	Direct and Converse Directions	54
49	Shorter Distance	54
50	The First Aspect Angle and the Subsequent Ones	54
51	The Limit or the Position of the D B at the end of a Direction	55
52	The Arc of Direction in the Directions to the Angles	56
53	The Arc of Direction in the Directions of the Bodies	57
54	Directions to Zodiacal Parallel	57
55	Directions to Zodiacal Rapt Parallel	60
56	Are Primary Zodiacal Directions Rational?	60

### LESSON VI—MEASUREMENT OF TIME

57	Is the correction of the Arc of Direction for the annual motion of the Directed Body not necessary?	70
58	Determination of the correction for the annual motion of a Directed Body	70
59	The Measure of Time	71

## PART II—Secondary Directions

### LESSON VII—THE GENERAL PRINCIPLES OF SECONDARY DIRECTIONS

60	Secondary Directions	73
61	The Progressed Date corresponding to an Ordinal Year of Life	74
62	The Progressed Moment of Birth	76
63	Progressed Horoscopes	77

### LESSON VIII—SECONDARY DIRECTIONS TO THE RADICALS

64	Secondary Directions of the Progressed to the Radicals	81
65	Determination of the Arc of Direction	81
66	The Time measured to by an Arc of Direction	83
67	Secondary Directions to the Parallels of the Radicals	85

### LESSON IX—SECONDARY DIRECTIONS TO THE PROGRESSED

68	Secondary Directions of the Progressed to the other Progressed	88
69	Determination of the Arc of Direction	88
70	Time Measured to	90
71	Secondary Directions to the Parallel of the other Progressed	90
72	The Graph Method	94
73	Are Progressed Horoscopes to be cast for Mean time or Apparent Time of Birth?	95

### LESSON X—PROGRESSION OF THE ANGLES

74	Can Progressed Angles be directed?	96
75	Can Progressed Angles be directed to?	97

### LESSON XI—SIMPLIFIED SECONDARY DIRECTIONS

76	' Planets at Noon Method	98
77	The Radix System	99

## PART III—Epochal Aspects

### LESSON XII—EPOCHAL ASPECTS

78	Epochal Aspects	100
79	Synodical Lunation	100
80	Determination of all the Epochal Aspects on a given date	101
81	Solar Revolution or Return	103
82	Solar Return to the Progressed Sun	108
83	Current Synodical Lunations	109

84	Determination of all the Aspects at a current Synodical Lunation .	109
85.	Lunar Revolution or Return	... 112
86.	Diurnal Map	... 113

## PART IV—Transits

### LESSON XIII—CURRENT ASPECTS OR TRANSITS

87.	Transits	... 115
88	Determination of all the Transits at a given time	... 116
89.	Comparative study of Aspects and Directions	.. 129
	Answers	... 134-160
	Tables	... 161-202
	Errata	... 203
	Index	... 204 208

TO THE  
MEMORY  
OF  
MY BELOVED PATERNAL GRAND FATHER  
M RANGA PILLAI

# TEXT-BOOK ON DIRECTIONAL CALCULATIONS

## LESSON I—INTRODUCTION

**1 The Standard Nativity**—Mathematical subjects are best taught when they are illustrated with solved problems exemplifying the various principles. As it would conduce to the better understanding of the subject to take a single horoscope to illustrate all the calculations, I propose to take up that of George V for the purpose. He was born in Marlborough House, London,  $51^{\circ} 20' N$  geocentric latitude and 0 hour 0 minute 37 seconds W. longitude, at 1 18 A M G M T, on Saturday, June 2/3, 1865. And for the purpose of providing exercises to be worked out by the reader, I shall take up the horoscope of one born at  $12^{\circ} 59' N$  geocentric latitude, and 5 hours 21 minutes E longitude, at 8 41 A M, L M T, on Wednesday, December 13, 1871, which will be referred to as the standard nativity.

**2 Zodiacal Positions of Bodies**—The zodiacal position of a body is its position in the ecliptic circle and is expressed by the two co-ordinates the celestial longitude and celestial latitude. The determination of the zodiacal positions of bodies at birth, is discussed in Lesson IV of my Text book on Mathematical Astrology. They are known as the **radical positions**. Let us agree to state longitudes in degrees and minutes reckoned from the First Point of Aries, dropping the names of the zodiacal signs e.g.  $207^{\circ} 46'$  for  $27^{\circ} 46'$ . The zodiacal positions of celestial bodies at George V's birth were as —

Body	Long	Lat	Body	Long	Lat	Body	Long	Lat
☉	$72^{\circ} 26'$	$0^{\circ} 0'$	☿	$39^{\circ} 39'$	$1^{\circ} 29' S$	♄	$204^{\circ} 6'$	$2^{\circ} 39' N$
☽	$181^{\circ} 3'$	$2^{\circ} 47' S$	♂	$125^{\circ} 35'$	$1^{\circ} 26' N$	♊	$88^{\circ} 37'$	$0^{\circ} 12' N$
☿	$48^{\circ} 29'$	$3^{\circ} 17' S$	♌	$265^{\circ} 40'$	$0^{\circ} 26' N$	♍	$10^{\circ} 10'$	$1^{\circ} 30' N$

Exercise (1)—Find the zodiacal positions of all the bodies in the standard nativity.

**3 The Zodiacal Positions of Cusps of Houses**—The zodiacal cusps or the first points of the zodiacal houses have only longitudes and no latitude being ecliptic points. The determination of the zodiacal cusps is fully gone into in Lesson V of my Text book on Mathematical Astrology. They are also found readily worked out in my Century Tables of Houses in which all the non angular,



namely, the second, third, twelfth and eleventh, as well as the angular, namely, the first and tenth cusps, are given correct to the first place of decimal, for every integral minute of sidereal time, that is, for every fifteen minutes of arc in R.A.M.C. The R.A.M.C. at George V's birth was  $270^{\circ} 51' 33''$ , and the geocentric latitude of the birth place was  $51^{\circ} 20' N$ . The longitudes of the cusps at R.A.M.C.  $270^{\circ} 51' 33''$ , and for N. geocentric latitude  $51^{\circ} 20'$  as given in Century Tables of Houses are —

Cusp	Long.	Cusp	Long.
X	$270^{\circ} 47' 3'$	I	$2^{\circ} 27'$
XI	289 7 2	II	48 41' 2
XII	313 40' 8	III	72 36' 6

Exercise (2)—Find the longitudes of the cusps of houses in the standard nativity

4. **Zodiacal Map**—The zodiacal positions of bodies and of cusps at a birth are best presented in the form of a map of the heavens at the moment.

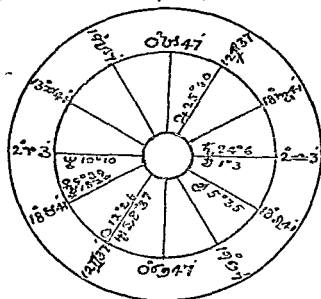


Fig. I—The Zodiacal Map at George V's birth.

Exercise (3)—Erect the zodiacal map of the heavens for the standard nativity

6 **Mundane Positions of Bodies**—The mundane position of a body is its position in the heavens in relation to a particular birth place on Earth. It may be stated in one of two ways, (1) by the angular distance at which the body is from its nearer meridional half, which is spoken of as its upper meridional distance (U.M.D) or its lower meridional distance (L.M.D), or (2) by the angular distance at which the body is either forwards (anti-clockwise) from the cusp of

its mundane house, termed the **cuspal distance forwards** (C D F), or backwards (clockwise) from the cusp of its next anti clockwise house, termed the **cuspal distance backwards** (C D B). The determination of the radical mundane positions is dealt with in the latter part of Lesson VI of my Text book on Mathematical Astrology. To find these positions, the R A's, the declinations and the semi arcs of bodies have to be first determined, which is gone into in the former part of Lesson VI of my Text book on Mathematical Astrology. The determination of the mundane cusps is included in the above solution. The mundane positions of the bodies in George V's nativity are —

Body	M	D	Position	Body	M	D	Position	Body	M	D	Position
☿	80°	L 57'	I 5° 44'	☾	19°	L 54'	II 19° 32'	♄	89°	L 7'	VI 26° 54'
♂	53	L 9	I 19 41	♂	2	L 22	III 16 34	♃	67	U 36	VII 13 46
♂	43	L 55	II 3 49	♂	37	L 28	V 16 38	♃	5	U 35	IX 13 46

Exercise (4)—Find the mundane positions of all the bodies in the standard nativity

**6 Combined Mundane Map**—The mundane positions of bodies have not till the publication of my Text book on Mathematical Astrology been presented in the form of a map, because each body has its own set of twelve mundane houses, the R A's of whose cusps, except the tenth, vary. So, each body has its own mundane map, and consequently the whole set of mundane maps is omitted as being not feasible. This omission necessitates the calculation of mundane directions with the aid of zodiacal maps. Such a practice necessarily gives rise to much confusion, and leads to errors and oversights in directional calculations. For example, Mercury in George V's nativity is in the first zodiacal house but in his second mundane house (see Fig I and II). Should we elect to omit the degrees and minutes in the R A's of the cusps of the mundane houses of different bodies, and to give only their C D F's in the mundane houses occupied by them, we can erect a single combined mundane map with the mundane positions of all bodies shown in it. Such a combined mundane map will be helpful in working out mundane directions, as will be seen presently in the discussion of mundane directions. So I have designed one on the lines indicated above, which is given on Page 5 for George V's nativity.

Exercise (5)—Erect the combined mundane map for the standard nativity

**7 Speculum**.—The celestial longitudes, the celestial latitudes, the right ascensions, the declinations, the meridional distances, the semi arcs, the mundane house spaces, the cuspal distances, and the horizontal distances of the different bodies when determined may be entered in a tabular statement called the **speculum**, for ready reference in directional calculations. The speculum for George V's nativity is given in Schedule I below.

Exercise (6)—Prepare the speculum for the standard nativity,

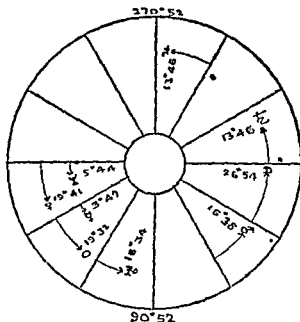


Figure II—The Combined Mundane Map for George V's nativity—The figures are the C.D.F.'s of the bodies.

**8 Zodiacal and Mundane Aspects**—All about the determination of all the zodiacal aspects and parallels and of all the mundane aspects and parallels between the several pairs of bodies, are very fully set out in Lesson VII of my Text-book on Mathematical Astrology. The reader is strongly recommended to master the subject, else he will feel a great deal of difficulty in understanding the subject of directional calculations. In fine, the subject of aspect determination is the foundation on which rests the problem of calculating directions.

In George V's nativity all the Zodiacal Aspects are —

☿ S    ♀	☿ A ☐ ♀	☿ A    ♀	♂ A ☐ ♀	♂ S ♂ ♀
☿ S ☐ ♀	♂ A ± ♀	☿ A    ♀	♂ A    ☉	♂ A    ♀
☿ S ☐ ♀	♂ S    ♀	☿ S ✕ ♀	♂ A ✕ ♀	♂ S Δ ♀
☿ A ± ♀	☉ S * ♀	☉ S * ♀	♂ A ☐ ♀	
☿ A ✕ ♀	☉ A Δ ♀	♂ A Δ ♀	♂ A * ♀	

Exercise (7)—Determine all the zodiacal aspects in the standard nativity,

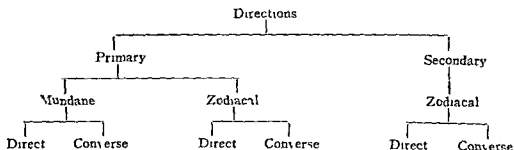
And all the Mundane Aspects in George V's nativity are —

☿    ♀	☿ A ± ♀	☉ A Δ ♀	♂ A Δ ♀	♂ A * ♀
☿ A ☐ ♀	♂ A ✕ ♀	☉ A ☐ ♀	♂ S * ♀	♂ S Δ ♀
☿ S ☐ ♀	♂ S * ♀	☉ S ✕ ♀	♂ A * ♀	♂ S ♂ ♀
☿ S ✕ ♀	♂ A ☐ ♀	☉ S ✕ ♀	♂ S Δ ♀	♂ A * ♀
☿ S ✕ ♀	♂ S * ♀	☉ S ☐ ♀	♂ A Δ ♀	♂ S Δ ♀
☿ A Δ ☉	☉ A * ♀	♂ S ☐ ♀	♂ S ♂ ♀	

Exercise (8)—Determine all the mundane aspects in the standard nativity

± Signifies the Biquintile aspect

primary direction is one which rests on the apparent diurnal rotation of the heavens and a secondary direction is one which rests on the annual revolution of bodies (ii) Primary directions are also divided into mundane and zodiacal ones, according as the aspect extent of direction is measured upon the equator or the ecliptic. Primary mundane directions are those in which the aspect extents of directions are measured upon the equatorial circle and primary zodiacal directions are those in which the aspect extents of directions are measured upon the ecliptic circle. But secondary directions are all zodiacal, as the aspect extents of directions are always measured upon the ecliptic (iii) A primary or secondary direction may be direct or converse, according as the course of direction is in consonance with or contrary to what obtains in nature. A body is said to move anti-clockwise in a circle when it moves against the hands of a watch, and clockwise when it moves with the hands of a watch. In primary mundane directions, a direction in which the DB is moved clockwise is said to be a direct direction, as the clockwise course of direction is in consonance with the natural apparent clockwise rotation of bodies in the heavens and one in which the DB is moved anti-clockwise is said to be a converse direction, as the anti-clockwise course of direction is opposed to what apparently obtains in nature. But in primary zodiacal directions and in secondary directions, one in which the DB is moved anti-clockwise is said to be a direct direction, since the anti-clockwise course of direction is in consonance with the anti-clockwise annual motion of bodies and one in which the DB is moved clockwise is said to be a converse direction since the clockwise course of direction is opposed to the natural anti-clockwise annual motion of bodies. All the above diverse classes of directions may be presented in the form of a pedigree as shown below. I propose to discuss the claims of these several groups of directions to be adopted in practice taking each group in its proper place.



**12 Notation of Directions**—We should adopt a uniform method of noting directions, as it would avoid confusion. So, the symbol of the directed body is written first, next the symbol of the aspect of direction, and lastly the symbol of the stationary position, that is the body or angle to whose aspect the direction

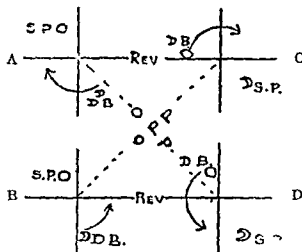
is made, e.g., O \* q which means that the Sun is directed to the Sextile aspect of the Moon. And the word 'direct' or 'converse' along with the name of the class of directions, e.g., 'primary mundane', 'primary zodiacal' or 'secondary' are also mentioned.

**13 The Rules framed are Exhaustive, Comprehensive and Universal**—In books on Directions, primary directions to fractional aspects, such as the quintile, are ignored, on the score that they are not of much significance, and those to aspects other than the conjunction and the opposition of the two Angles are usually omitted, as they are considered to be of little or no consequence. But they seem to be omitted especially because the formulæ and rules for calculating the arcs of directions become necessarily complicated and difficult. So I have framed rules under each class of directions, that would be applicable to all cases alike. Also, no attempt has been made in books to determine the very first primary direction after birth between all possible pairs of bodies, nor to work out the entire series of all the subsequent directions. On the other hand directions are chosen at present by inspection and guess work, and very meagre rules of no universal application are followed. But the rules that I have framed are exhaustive, comprehensive and of universal application, and so are scientific, and will help one to determine all directions to fractional as well integral aspects, from the very first moment after birth to any period of life.

**14 Measurement of Time**—The time when the effects of a direction are said to be realised in life, is always at a period later than the time when the direction will stand completed. Every four minutes after birth in primary directions, and every day after birth in secondary ones is made to measure to one year in life. Therefore, only such directions as could operate within the probable limits of life, such as 75 or 80 or 90 years, need be calculated.

**15 Reverse and Opposite Directions**—In books on Directions the expressions 'reverse direction' and 'opposite direction' are used rather indiscriminately. It would be better to restrict either of them to particular classes of directions which have no definite names. Two directions may be said to be the **reverse** of one another when they are both alike direct or converse with the directed body and the stationary position in one as the stationary position and the directed body in the other. And two directions may be said to be the **opposite** of one another when one is direct and the other converse with the directed body and the stationary position in one as the stationary position and the directed body in the other. That is, in each pair of both reverse and opposite directions, the DB and SP exchange their places, but while a pair of directions which are the reverse of one another are both alike direct or converse a pair of directions which are the opposite of one another are contrary in their course one being direct and the other

converse For example, if the directions illustrated in Figure III are taken to be primary ones, then A and C are both direct primary ones which are the Reverse of one another, and B and D are both converse primary ones which are the Reverse of



- (A) (i) Direct primary or  
(ii) Converse Secondary  
(B) (i) Converse Primary or  
(ii) Direct Secondary

- (C) (i) Direct Primary or  
(ii) Converse Secondary  
(D) (i) Converse Primary or  
(ii) Direct Secondary

Fig III—Directions between the same two bodies,—D B the directed body S P the stationary position and the arrow mark indicates the course of direction

one another. Whereas A and D are the Opposite of one another, and B and C are likewise the Opposite of one another. Again, if the directions illustrated in Figure III are taken to be secondary ones, then A and C are both converse secondary ones which are the Reverse of one another, and B and D are both direct secondary ones which are the Reverse of one another. Whereas A and D are the Opposite of one another, and B and C are likewise the Opposite of one another. The directions portrayed in Figure III viewed separately as (i) primary and (ii) secondary ones, may be noted in conformity with the principle laid down in Article 12 as set forth hereunder. It may also be noted that A and B are the converse of one another, and so are C and D.

- |                             |                    |
|-----------------------------|--------------------|
| (A) (i) D A O dir Prim Mund | (ii) D A O con sec |
| (B) (i) " con "             | (ii) " dir "       |
| (C) (i) O A D dir "         | (ii) O A D con "   |
| (D) (i) " con "             | (ii) " dir "       |

**16 Are Converse Directions Admissible?**—To state the question in general terms, are directions of bodies contrary to what obtains in nature possible? Converse directions are unnatural, and so they are incontestably impossible. In

## LESSON II

### PRIMARY MUNDANE DIRECTIONS

18. **Primary Mundane Directions**—Primary mundane directions may be viewed to be direct or converse. Direct primary mundane directions are those in which the directed body is moved clockwise; and converse primary mundane directions are those in which the directed body is moved anti-clockwise. The path of direction is along the equator. Only a celestial body can be the directed body (D.B.), and only an angle or the radical position of a body can be the stationary position (S.P.). In primary mundane directions D.B. is directed to a mundane aspect of the position of only an angle or radical body. As there are nine bodies and eleven positions, so we have  $9 \times 11$  or 99 groups of primary mundane directions, with the same D.B. and S.P. in each group. And as there are twelve aspects—Conjunction, semi-sextile, semi-quintile, semi-square, Sextile, quintile, Square, Trine, sesquiquare, bi-quintile, quincunx, and Opposition—leaving aside the Parallel, we obtain  $99 \times 12$  or 1188 possible primary mundane directions. Since the heavens are perpetually rotating clockwise, every celestial body is dislocated clockwise [anti-clockwise]\* from its radical mundane position, that is, from I house to XII, XII to XI [XI house to XII, XII to I] and so on, reaching first the cusp of its own mundane house [the cusp of its next anti-clockwise house] and next the cusps of its successive clockwise [anti-clockwise] houses till it arrives at its clockwise [anti-clockwise] horizon and rises or sets, and finally arrives at its own radical mundane position after 24 sidereal hours or one sidereal day. During this clockwise [anti-clockwise] rotation of the D.B., its clockwise [anti-clockwise] distance from every one of the eleven radical positions or the S.P.'s, continuously changes. The change may be an increase or decrease. Primary mundane directions may be calculated by adopting the mundane position as expressed by mundane distance or cuspal distance. The former will not be adopted as it will apply only to cases of conjunction and opposition, and the latter will be adopted as it will apply to cases of all aspects alike.

19 **Clockwise and Anti-clockwise Distances from D B to S P**—Two bodies on a circle will always have two arcs or distances between them. Each distance will be clockwise to only one of the two bodies, and anti-clockwise to the other. For example, in Figure IV the arcs A M B and B N A are the

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\*The expressions within braces [ ] apply throughout to the cases of converse directions.

two distances between A and B, of which A M B is clockwise to A, and anti clockwise to B and B N A is clockwise to B, and anti clockwise to A To find the clockwise distance from a D B to an S P, deduct the mundane position

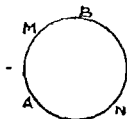


Fig. IV—Clockwise and Anti clockwise distances

of the S.P from that of the D.B. (see Mathematical Astrology, Lesson VII, end of Art 130). But the easiest method is to add (i) the C D F of the D B, (ii) the integral number of mundane houses running clockwise between the house of the D B and that of the S P, and (iii) the C.D.B of the S P moderated to the S A of D B at birth as follows, taking all arcs as they stood at birth —

Birth S A of S P    its C D B    birth S A of D B    moderated C D B of S P.

**Dictum I**—Take all arcs as they stood at birth, in calculating distances

For example, to obtain the mundane clockwise distance from Juptier, ix  $13^{\circ} 46'$  to Saturn, VII  $13^{\circ} 46'$ , first moderate the C.D.B of Saturn to the birth S A of Jupiter, the birth S A of Saturn being  $81^{\circ} 22'$ , its C D B  $13^{\circ} 21'$ , and the birth S A of Jupiter,  $58^{\circ} 4'$ , proceed as follows —

$81^{\circ} 22' - 13^{\circ} 21' = 68^{\circ} 01'$ , the C D B of Saturn mod to the birth S A of Jupiter (A c)  $965517 + 1'12979 + 049135 = 127631$ , T.P.L of  $9^{\circ} 32'$ , (mod C D B of  $24$ ) Therefore, the mundane clockwise distance from Jupiter (D B) to Saturn (S P) is  $13^{\circ} 46' + 1 + 9^{\circ} 32'$ , i.e.,  $23^{\circ} 18'$

Now, if the right ascensional degrees and minutes so obtained, is less than one house space of the D B as it stood at birth, retain it as it is but if it is greater, then deduct one house space from the degrees and minutes obtained and add one to the number of integral houses In the above example,  $23^{\circ} 18'$  is greater than  $19^{\circ} 21'$ , one diurnal house space of Jupiter, so deduct  $19^{\circ} 21'$  from  $23^{\circ} 18'$ , and add one to 1, and we obtain  $113^{\circ} 57'$  as the mundane clockwise distance from Jupiter to Saturn Again, the clockwise distance from the Sun to Mercury is  $19^{\circ} 32' + 11 + 16^{\circ} 34'$ , the C D B of Mercury moderated to the Sun (see Sch II), i.e.,  $1136^{\circ} 6'$ , and  $19^{\circ} 43'$  is one nocturnal house space of Sun. So  $1136^{\circ} 6'$  is equivalent to  $1116^{\circ} 23'$  which is to be taken as the clockwise distance from the Sun to Mercury

The anti clockwise distance from a D B. to an S P is readily had, being nothing but the explement of the clockwise distance, i.e.,  $12$  mundane houses minus the clockwise distance But to find the anti clockwise distance independently of the clockwise distance, reverse the above method, i.e., deduct the mundane position of the D B from that of the S P But as before the easiest method is to add (i) the C D B of the D B, (ii) the integral number of mundane houses running anti clockwise between the house of the D B and that of the S P, and (iii) the



C D I of the S P moderated to the birth S A of D B as follows —

Birth S A of S P its C D I birth S A of D B moderated C D I of S P  
For example to obtain the mundane anti clockwise distance from Jupiter (D B)  $11^{\circ} 13' 46''$ , to Saturn (S P) VII  $13^{\circ} 46'$ , first moderate the C D I of Saturn to the birth S A of Jupiter, the birth S A of Saturn being  $81^{\circ} 22'$ , its C D F  $13^{\circ} 46'$  and the birth S A of Jupiter,  $58^{\circ} 4'$ , proceed as follows —

$81^{\circ} 22' 13^{\circ} 46' 58^{\circ} 4'$  C D I of Saturn mod to the birth S A of Jupiter  
(A C)  $965517 + 111644 + 049135 = 126296$  T P L of  $9^{\circ} 49'$ , mod C D I of  $\pi$   
Therefore the mundane anti clockwise distance from Jupiter to Saturn is  $5^{\circ} 35' + 11^{\circ} 13' 46' + 9^{\circ} 49'$ , i.e.  $11^{\circ} 15' 24''$  and as  $15^{\circ} 24'$ , the degrees and minutes obtained is less than  $19^{\circ} 21'$ , one diurnal house space of Jupiter, we retain it as it is and take the sum as the mundane anti clockwise distance from Jupiter to Saturn. But if the degrees and minutes in the sum were greater than one appropriate house space of the D B, then deduct the latter from the former, and add one to the integral number of houses in the sum as stated above. Again the anti clockwise distance from Neptune to Venus is  $23^{\circ} 10' + 11^{\circ} 23' 26''$  the C D I of Venus moderated to Neptune (see Sch II), i.e.  $11^{\circ} 46' 36''$ , and  $28^{\circ} 54'$  is one nocturnal house space of Neptune. So  $11^{\circ} 46' 36''$  is equivalent to XII  $17^{\circ} 42''$  which becomes the anti clockwise distance from Neptune to Venus. Therefore we have

**Rule I**—The clockwise distance (C L D) from D B to S P is C.D.F. of D B + the number of clockwise mundane houses between D B s and S P s houses + the C.D.B of S P moderated to S A of D B at birth and the anti clockwise distance (A C L D) from D B to S P is C D B of D B + the number of anti-clockwise mundane houses between D B s and S P s houses + the C.D.F of S P moderated to S A of D B at birth

**Rule II**—When the degrees and minutes in the clockwise or the anti clockwise distance exceed one house space of D B at birth, deduct the house space from the C L D or A C L D and add one to the number of houses in the C L D or A C L D. If not retain the C L D or A C L D as it is

**Rule III**—The moderation of C D B [C D F] of S P is as follows —  
Birth S A of S P its C.D.B [C D F] birth S A of D B mod C.D.B [C D F]

**20 The Shorter Distance between D B and S P**—The clockwise distance is required in the calculations of the direct mundane directions and the anti clockwise distance in those of the converse mundane directions. As all aspect extents are less than the extent of vi mundane houses we always require arcs less than vi houses. If either the clockwise distance or the anti clockwise distance found as described in the previous article is less than vi mundane houses then it is also the shorter distance. But if it is greater than vi mundane houses, then rectify it by deducting it from XII mundane houses to obtain the shorter distance which

may now be termed the **rectified shorter distance**. To facilitate subtraction of mundane distances, instead of  $xii$  mundane houses take  $xi$  mundane houses plus one house space of the DB at birth. For example, as shown in the previous article, the clockwise distance from Jupiter to Saturn being  $ii\ 3^\circ\ 57'$ , it is taken, as it is, as the shorter distance. But the anti clockwise distance from Jupiter to Saturn, as shown in the previous article, is  $ix\ 15^\circ\ 24'$ , and it is greater than  $vi$  mundane houses, and so has to be rectified by deducting it from  $xii$  houses, i.e.,  $xi$  houses +  $19^\circ\ 21'$ , which latter is one diurnal house space of Jupiter. Therefore, the rectified shorter distance from Jupiter to Saturn is  $xi\ 19^\circ\ 21' - ix\ 15^\circ\ 24'$ , i.e.,  $ii\ 3^\circ\ 57'$ . Hence, the shorter distance from a given body to a particular body is always identically the same, no matter if it has been derived from their clockwise or anti clockwise distance with this difference that if a shorter distance has been obtained by the rectification of clockwise distance then the same shorter distance will be obtained without the rectification of the corresponding anti clockwise distance, and vice versa (see Schedule III).

**Dictum II**—When an arc exceeds a semi circle or six houses, rectify it by deducting it from a full circle of twelve houses.

Again, when the clockwise or anti clockwise distance exceeds  $xii$  houses, then cast off the full circle of  $xii$  houses and take only the remaining degrees and minutes as the shorter distance. In such a case the shorter distance is to be deemed to be an SD obtained with no rectification. Such a contingency arises when DB and SP are in the same house with the DB anti clockwise [clockwise]. For example, the clockwise distance from the Sun to Mercury is  $xii\ 16^\circ\ 23'$ , so cast off the  $xii$  houses and take the remainder  $16^\circ\ 23'$  as the shorter distance obtained with no rectification. And the anti clockwise distance from Neptune to Venus is  $xii\ 17^\circ\ 42'$ , and casting off  $xii$  the shorter distance with no rectification is  $17^\circ\ 42'$ . Therefore we have

**Rule IV**—(a) When the Cl D [Acl D] is not more than  $vi$  mundane houses, it is the shorter distance (SD). (b) when it is greater than  $vi$  but less than  $xii$  houses,  $xi$  houses + one house space of DB at birth minus Cl D [Acl D] is the rectified shorter distance (SD) and (c) when it exceeds  $xii$  houses casting off  $xii$  houses, the balance is the shorter distance (SD) obtained with no rectification.

**21 Increasing and Decreasing Series of Aspects of Direction**—In primary mundane directions, when the clockwise [anti clockwise] distance has not been rectified to obtain the shorter distance the aspects continuously decrease yielding a decreasing series of aspects, which may be termed **Case I**. And when the clockwise [anti-clockwise] distance has been rectified to obtain the shorter distance, they continuously increase, yielding an increasing series of aspects which may be termed **Case II**. So, in Case I the aspect extent of the very first aspect of direction

will be just smaller than the clockwise [anti-clockwise] distance between DB and SP, and the aspect extents of the subsequent aspects will go on decreasing till Conjunction and then they will begin to increase. And in Case II, the aspect extent of the very first aspect of direction will be just greater than the clockwise [anti-clockwise] distance between DB and SP, and the aspect extents of the subsequent aspects will go on increasing till Opposition and then they will begin to decrease. For example, iv  $12^{\circ} 30'$ , the SD from Mars to Neptune, direct, has been obtained with no rectification of the Cl D., so the first aspect extent is just less than the SD, iv  $12^{\circ} 30'$ , and so it is iv  $0^{\circ} 0'$  or trine, and the subsequent aspects decrease e.g., square, sextile and so on to Conjunction, and then increase: again, iii  $19^{\circ} 2'$ , the SD from Mars to Jupiter, direct, has been obtained by the rectification of Cl D., viii  $1^{\circ} 48'$ , so the first aspect extent is just greater than the SD, iii  $19^{\circ} 2'$ , and it is iv  $0^{\circ} 0'$  or trine and the subsequent aspects increase, e.g., sesqui square, quincunx, and Opposition, and then decrease. So, we have

**Rule V—**(a) When the shorter distance has been obtained without rectification the extent of the first aspect of direction is just Less than the SD, and the extents of the subsequent aspects Decrease till Conjunction and then Increase and (b) when the SD has been obtained with rectification, then the extent of the first aspect of direction is just Greater than the SD, and the extents of the subsequent aspects Increase till Opposition, and then Decrease.

**22 The Scale of the Aspect Extents of Directions—**The extents of aspects taken should always be those of DB. They may be either on the scale of DB's diurnal or nocturnal SA, according as the DB was above or below its horizon at birth. For example, in the direct directions of Jupiter which is above its horizon at birth, its SDA is taken to start with and is changed for its SNA when it sets in the west; again, in the direct directions of Mars which is below its horizon at birth its SNA is taken to start with and is changed for its SDA when when it rises in the east. Therefore we have

**Rule VI—**(a) The Aspect Extents are always to be taken on the scale of the Diurnal houses of DB so long as DB is Above its horizon and (b) on the scale of the Nocturnal houses of DB so long as DB is Below its horizon.

But the aspect extents of the DB are always to be measured from the SP towards the DB along the SD. For example in the direct directions of Mars to Neptune, the extent of trine the first aspect of direction and those of the subsequent aspects are all measured from Neptune towards Mars along the unrectified SD, iv  $12^{\circ} 30'$ . Again in the direct directions of Mars to Jupiter the extent of trine the first aspect of direction and those of the subsequent aspects are all measured from Jupiter towards Mars along the rectified SD iii  $19^{\circ} 2'$ . Therefore, we have

**Rule VII**—Aspect Extents are always to be measured from the SP towards the DB along the SD between them

**23 Arcs of Directions**—The Arc of Direction (AD) is the arc through which DB is moved during a direction. In Case I the first arc of direction is equal to the shorter distance minus the first aspect extent and in Case II it is equal to the first aspect extent minus the shorter distance. For example, in the direct directions of Mars to Neptune the unrectified shorter distance being  $12^{\circ} 30'$  and the first aspect extent trine or  $120^{\circ} 0'$  the first arc of direction is  $12^{\circ} 30' - 120^{\circ} 0' = 12^{\circ} 30'$ . Again, in those of Mars to Jupiter, the rectified shorter distance being  $19^{\circ} 2'$ , the first aspect extent, trine or  $120^{\circ} 0'$ , and one nocturnal house space of Mars being  $20^{\circ} 50'$ , the first arc of direction is  $20^{\circ} 50' - 19^{\circ} 2' = 1^{\circ} 48'$ . Therefore, we have

**Rule VIII**—In Case I, the First AD = SD—the First AE and in Case II, the First AD = the First AE—SD

When an aspect extent is an integral number of houses, deduct one from the number of houses and add instead of it the degrees and minutes of one house space of DB. In both Cases I and II the AD of a subsequent direction always exceeds the previous AD by the difference between the previous aspect extent and the subsequent aspect extent. For example, the subsequent ADs in the direct directions of Mars to Jupiter are—

Mars sesqui square Jupiter,	$1^{\circ} 48' + (120^{\circ} 24' - 120^{\circ} 0') = 1^{\circ} 48' + 10^{\circ} 24' = 12^{\circ} 12'$
Mars bi quintile Jupiter,	$12^{\circ} 12' + (120^{\circ} 39' - 120^{\circ} 24') = 12^{\circ} 12' + 6^{\circ} 15' = 18^{\circ} 27'$
Mars quincunx Jupiter	$18^{\circ} 27' + (120^{\circ} 0' - 120^{\circ} 39') = 18^{\circ} 27' + 4^{\circ} 10' = 22^{\circ} 37'$
Mars opposition Jupiter,	$22^{\circ} 37' + (120^{\circ} 0' - 120^{\circ} 0') = 22^{\circ} 37' + 20^{\circ} 50' = 43^{\circ} 27'$
Mars quincunx Jupiter	$43^{\circ} 27' + (120^{\circ} 0' - 120^{\circ} 0') = 43^{\circ} 27' + 20^{\circ} 50' = 64^{\circ} 17'$
Mars bi quintile Jupiter,	$64^{\circ} 17' + (120^{\circ} 0' - 120^{\circ} 39') = 64^{\circ} 17' + 4^{\circ} 10' = 68^{\circ} 27'$
Mars sesqui square Jupiter,	$68^{\circ} 27' + (120^{\circ} 39' - 120^{\circ} 24') = 68^{\circ} 27' + 6^{\circ} 15' = 74^{\circ} 42'$
Mars trine Jupiter,	$74^{\circ} 42' + (120^{\circ} 24' - 120^{\circ} 0') = 74^{\circ} 42' + 10^{\circ} 24' = 85^{\circ} 6'$

Therefore we have

**Rule IX**—(a) In Case I, Subsequent AD = the Previous AD + (the Previous AE—the Subsequent AE) and  
(b) in Case II, Subsequent AD = the Previous AD + (the Subsequent AE—Previous AE)

**24 The Moderation of AD on DB Crossing its Horizon**—Bodies below their horizon moved by the apparent diurnal rotation of the heavens rise above their eastern [western] horizon (see Articles 18 and 22) during the very first or a subsequent direction when the AD exceeds its eastern [western] horizontal distance. And bodies above their horizon set below their western [eastern] horizon during the very first or a subsequent direction when the AD exceeds its western

[eastern] horizontal distance. This is said to be the crossing of its horizon by a DB. Therefore, the appropriate horizontal distance for bodies above their horizon is the western [eastern] horizontal distance, and for bodies below their horizon is the eastern [western] horizontal distance. For example in direct direction, the appropriate horizontal distance (HD), for Saturn and Jupiter which are both above their horizon in George V's nativity, is the western horizontal distance (WHD), and the appropriate HD for the other bodies which are all below their horizon is the eastern horizontal distance (EHD). Therefore, we have

**Rule X**—The appropriate HD (i) of a body above its horizon is its WHD [EHD], and (ii) of a body below its horizon is its EHD [WHD].

To obtain the EHD of a body, its CDF [CDB] is to be added to the total space of all the houses running clockwise [anti clockwise] between its house and the eastern horizon. And to obtain the WHD of a body, its CDB [CDF] is to be added to the total space of all the houses running clockwise [anti clockwise] between its house and the western horizon. For example, the EHD of Mars, direct, which is below its horizon, is  $16^{\circ} 38' + 4 \times 20^{\circ} 49' 7, i.e., 99^{\circ} 57'$ . Again, the WHD of Jupiter, direct, which is above its horizon, is  $13^{\circ} 46' + 2 \times 19^{\circ} 21' 3, i.e., 52^{\circ} 29'$ . Therefore, we have

**Rule XI**—(i) The EHD of a body = its CDF [CDB] + the space of all houses running clockwise [anti clockwise] from the cusp of its [of its next anti clockwise] house to eastern horizon and (ii) the WHD of a body = its CDB [CDF] + the space of all the houses running clockwise [anti clockwise] from the cusp of its [of its next anti clockwise] house to western horizon. It will be evident that the spaces of all the houses will be on one and the same scale, diurnal or nocturnal, so long as AD does not exceed its appropriate HD. But when AD exceeds the appropriate HD of DB, DB will cross its horizon and the scale will change from one to the other—in the case of bodies above their horizon the change is from their SDA to SNA, and in those below their horizon, the change is from their SNA to SDA. In such circumstances, the excess of AD over HD should be moderated to the new SA of DB. The new SA of DB will be diurnal when DB rises in the east [west], and nocturnal when DB sets in the west [east]. The moderation of the excess of AD over the appropriate HD is carried on as follows —

Previous SA of DB    Subsequent SA of DB    Excess    Moderated Excess  
For example, to obtain the AD on Neptune crossing its horizon to form the direct square to Jupiter. Neptune being below and the direction direct, the appropriate HD is EHD which is  $5^{\circ} 44'$ , the unrectified SD is in  $14^{\circ} 4'$ , and the first aspect extent is just less than in  $14^{\circ} 4'$  which is square or in  $0^{\circ} 0'$ . Therefore, the first AD is equal to in  $14^{\circ} 4' - 111^{\circ} 0' 0', i.e., 14^{\circ} 4'$ , and  $14^{\circ} 4'$  is

greater than DB s EHD  $5^{\circ} 44'$  So the excess of AD over HD is  $8^{\circ} 20'$ , which has to be moderated to the SDA of Neptune, as it will be above its horizon after crossing. It is carried on as —

$86^{\circ} 41' \quad 93^{\circ} 19' \quad 8^{\circ} 20'$  moderated excess

(AC)  $996797$  (Sch vi)  $+133437=130234$ , TPL of  $8^{\circ} 58'$ , the mod excess Agam, in the direct direction, Saturn trine to the Sun, the AD obtained is  $0^{\circ} 27' + 13^{\circ} 34'$ , i.e.,  $14^{\circ} 1'$  which exceeds  $13^{\circ} 46'$ , the WHD of Saturn, by  $0^{\circ} 15'$ , which excess has to be moderated to  $98^{\circ} 38'$ , the SNA of Saturn whose SDA is  $81^{\circ} 22'$ , since Saturn is setting below its western horizon during the direction as follows —

$81^{\circ} 22' \quad 98^{\circ} 38' \quad 0^{\circ} 15'$  moderated excess

(AC)  $991642$  (Sch vi)  $+285354=276996$ , TPL of  $0^{\circ} 18'$ , the mod excess

Therefore, we have

**Rule XII**—The moderation of the excess of AD over HD is carried on —  
Previous SA of DB    Subsequent SA of DB    Excess    Moderated Excess

In such directions, the AD is equal to the sum of HD and the moderated excess. It should be borne in mind that the previous AD is not used in the calculations when a body crosses its horizon. For example, the AD of Neptune direct square to Jupiter is its EHD  $5^{\circ} 44'$  + its moderated excess,  $8^{\circ} 58'$ , which is equal to  $14^{\circ} 42'$ , and the AD of Saturn direct trine to the Sun is, its WHD  $13^{\circ} 46'$  + its moderated excess,  $0^{\circ} 18'$ , which is equal to  $14^{\circ} 4'$ . Therefore, we have

**Rule XIII**—The AD when DB crosses its horizon = HD + moderated excess

The subsequent ADs are found as usual only the scale of the aspect extents has to be changed from one to the other

**25 Directions to the Angles**—The above thirteen rules apply to the directions of bodies to the radical positions of Bodies. The rules have to be simplified to suit the cases of directions of bodies to the positions of the Angles, the (upper) Meridian and the (eastern) Horizon. (i) The SPs which are angles, have no CD to be moderated so Rule I does not apply. (ii) For the same reason, the Cl D in direct directions to an Angle is equal to CDF of DB + the number of clockwise houses between DB's house and the Angle, and the Acl D in converse directions, is equal to the CDB of DB + the number of anti-clockwise houses between DB's house and the Angle and so Rule II has to be modified as follows —

The Cl D is equal to the CDF of DB + the number of clockwise houses from the cusp of the DB's house and the Angle and the Acl D is equal to the CDB + the number of anti-clockwise houses from the cusp of the DB's next anti-clockwise house and the Angle

(iii) Rule III will not apply, since in the clockwise and the anticlockwise distance the odd right ascensional degrees and minutes are precisely the DB's C D F and C D B, and so will not exceed one house space of DB. (iv) Rules XII and XIII also will not apply, for DB will arrive at the horizon itself with no excess, and so AD and HD will always come to coincide sooner or later, forming conjunction or opposition to either Angle and square to the other Angle. So, while there is crossing and change in the scale of SA's there will be no excess of AD over HD to be moderated. Therefore, in directions to either Angle only Rules IV to XI and the above modification of Rule II apply, and not the rest.

## 26 Determination of the AD's in a Series of Primary Mundane

**Directions**—Now we are in a position to find the AD's of a series of primary mundane directions and of any particular primary mundane direction. It would facilitate calculations, if we preliminarily prepare the following five schedules—

(1) The CDB's and CDF's of every SP moderated to the birth SA of each DB, (Schedule II) (2) The SD's, rectified or unrectified, from every DB to each SP, derived from the clockwise and the anticlockwise distance between them, (Schedule III) (3) The AE's of every aspect of each DB, both on the diurnal and the nocturnal scale, (Schedule IV). (4) The appropriate EHD or WHD of every DB, (Schedule V) (5) The Ternary Proportional Logarithm of the ratio of the birth SA to the other SA of every DB, (Schedule VI). It should be noted well that in utilising the Schedule of Aspect Extents, firstly, that the series of the aspects of directions change from the decreasing one to the increasing one on reaching Conjunction, and from the increasing one to the decreasing one on reaching Opposition, and secondly, that the scale of the aspect extents changes from the nocturnal to the diurnal on the DB rising above its horizon in the east [west], and from the diurnal to the nocturnal on DB setting below its horizon in the west [east]. The five Schedules, II to VI, have the inestimable advantage of enabling the calculator to steer clear of slips and errors, otherwise inevitable, for there is a rhythm about the succession and the flow of the figures in each schedule when they are taken in particular orders, which the calculator on a slight reflection, will be able to readily realise and so to correct for himself easily all errors and slips that may creep into the schedules prepared.

We shall first calculate direct directions of bodies taken in their order at birth to (a) the two Angles, (b) the radical positions of Bodies and next take up the converse directions of bodies in their order to (c) the two Angles, and (d) the radical positions of Bodies. In these calculations, as persons do not generally live beyond 90 years, we shall determine all AD's whose measures do not exceed 90 degrees, but as a matter of fact, aspects for 75 years and AD's of 75 degrees will do amply.

Schedule II—Birth C D B.'s and C D F.'s of S.P.'s Moderated.

D B	C D	S P.								
		♈	♉	♊	♋	♌	♍	♎	♏	♐
♈	B	23 10	5 28	24 16	0 16	3 37	5 48	3 55	14 13	8 20
	F	5 44	23 26	4 38	28 38	25 17	23 6	24 59	14 41	20 34
♉	B	19 28	4 36	20 24	0 14	3 2	4 53	3 17	11 57	7 0
	F	4 49	19 41	3 53	24 3	21 15	19 24	21 0	12 20	17 17
♊	B	19 8	4 31	20 3	0 13	2 59	4 48	3 14	11 45	6 53
	F	4 44	19 21	3 49	23 39	20 53	19 4	20 38	12 7	16 59
♋	B	15 49	3 44	16 34	0 11	2 28	3 58	2 40	9 42	5 41
	F	3 54	15 59	3 9	19 32	17 15	15 45	17 3	10 1	14 2
♌	B	15 11	3 35	15 54	0 11	2 22	3 48	2 34	9 19	5 28
	F	3 45	15 21	3 2	18 45	16 34	15 8	16 22	9 37	13 28
♍	B	16 42	3 57	17 30	0 12	2 36	4 12	2 49	10 15	6 0
	F	4 8	16 53	3 20	20 38	18 14	16 38	18 1	10 35	14 50
♎	B	24 57	5 54	26 8	0 17	3 53	6 15	4 13	15 19	8 58
	F	6 10	25 13	4 59	30 50	27 14	24 52	26 54	15 48	22 9
♏	B	21 45	5 8	22 47	0 15	3 23	5 27	3 41	13 21	7 49
	F	5 22	21 59	4 20	26 52	23 44	21 40	23 26	13 46	19 18
♐	B	15 31	3 40	16 16	0 11	2 25	3 53	2 37	9 32	5 35
	F	3 50	15 41	3 5	19 10	16 56	15 28	16 44	9 49	13 46



Schedule IV —Aspect Extents of Directed Bodies—(Continued)

Nocturnal A E's of Sun	Diff	Aspect	Diurnal A E's of Sun	Diff.
0 0° 0'	19° 43' 0	♄	0 0° 0'	40° 17' 0
i 0 0	9 51	♅	i 0 0	20 9
i 9 51	9 52	♆	i 20 9	20 8
ii 0 0	7 53	♇	ii 0 0	16 7
ii 7 53	11 50	♈	ii 16 7	24 10
iii 0 0	19 43	♉	iii 0 0	40 17
iv 0 0	9 51	♊	iv 0 0	20 9
iv 9 51	5 55	♋	iv 20 9	12 5
iv 15 46	3 57	♌	iv 32 14	8 3
v 0 0	19 43	♍	v 0 0	40 17
vi 0 0			vi 0 0	
Noct. A E's of Uranus	Diff.	Aspect	Diurnal A E's of Uranus	Diff
0 0° 0'	18° 56	♄	0 0° 0'	41° 4'
i 0 0	9 28	♅	i 0 0	20 32
i 9 28	9 28	♆	i 20 32	20 32
ii 0 0	7 34	♇	ii 0 0	16 26
ii 7 34	11 22	♈	ii 16 26	24 38
iii 0 0	18 56	♉	iii 0 0	41 4
iv 0 0	9 28	♊	iv 0 0	20 32
iv 9 28	5 41	♋	iv 20 32	12 19
iv 15 9	3 47	♌	iv 32 51	8 13
v 0 0	18 56	♍	v 0 0	41 4
vi 0 0			vi 0 0	
Nocturnal A E's of Mars	Diff	Aspect	Diurnal A E's of Mars	Diff
0 0° 0	20° 50'	♄	0 0° 0'	39° 10
i 0 0	10 24	♅	i 0 0	19 36
i 10 24	10 25	♆	i 19 36	19 35
ii 0 0	8 20	♇	ii 0 0	15 40
ii 8 20	12 30	♈	ii 15 40	23 30
iii 0 0	20 50	♉	iii 0 0	39 10
iv 0 0	10 24	♊	iv 0 0	19 36
iv 10 24	6 15	♋	iv 19 36	11 45
iv 16 39	4 10	♌	iv 31 21	7 50
v 0 0	20 50	♍	v 0 0	39 10
vi 0 0			vi 0 0	

Schedule IV—Aspect Extents of Directed Bodies—(Continued)

Noct A E's of Moon	Diff	Aspect	Diurnal A E's of Moon	Diff
0 0° 0		d	0 0° 0	
I 0 0	31° 7	∞	I 0 0	28° 53
I 15 33	15 33	∠	I 14 27	14 27
II 0 0	15 33	*	II 0 0	14 27
II 12 27	12 27	Q	II 11 13	11 33
III 0 0	18 40	□	III 0 0	17 20
IV 0 0	31 7	Δ	IV 0 0	28 53
IV 15 33	15 33	□	IV 14 27	14 27
IV 24 53	9 20	±	IV 23 7	8 40
V 0 0	6 13	π	V 0 0	5 47
VI 0 0	31 7	g	VI 0 0	28 53
Diurnal A E's of Saturn	Diff	Aspect	Noct A E's of Saturn	Diff
0 0° 0		d	0 0° 0	
I 0 0	27° 7	∞	I 0 0	32° 53
I 13 34	13 34	∠	I 15 26	16 26
II 0 0	13 34	*	II 0 0	16 26
II 10 51	10 51	Q	II 13 9	13 9
III 0 0	16 16	□	III 0 0	19 44
IV 0 0	27 7	Δ	IV 0 0	32 53
IV 13 34	13 34	□	IV 16 26	16 26
IV 21 42	8 8	±	IV 26 18	9 52
V 0 0	5 26	π	V 0 0	6 34
VI 0 0	27 7	g	VI 0 0	32 53
Diurnal A E's of Jupiter	Diff	Aspect	Noct A E's of Jupiter	Diff
0 0° 0		d	0 0° 0	
I 0 0	19° 21	∞	I 0 0	40° 39'
I 9 41	9 41	∠	I 20 19	20 19
II 0 0	9 41	*	II 0 0	20 19
II 7 45	7 45	Q	II 16 15	16 15
III 0 0	11 36	□	III 0 0	24 24
IV 0 0	19 21	Δ	IV 0 0	40 39
IV 9 45	9 41	□	IV 20 19	20 19
IV 15 30	3 49	±	IV 32 30	12 11
V 0 0	3 52	π	V 0 0	8 8
VI 0 0	19 21	g	VI 0 0	40 39

Schedule V—The appropriate E H D or W H D of bodies in both direct and converse directions

Body	Rises or sets	In Direct Direction		In Converse Direction	
☿	Rises	5° 44'	E H D	167° 35'	W H D
♀	"	19 41	E H D	125 59	W H D
♂	"	27 41	E H D	115 31	W H D
♂	"	39 15	E H D	79 3	W H D
♂	"	54 26	E H D	59 10	W H D
♂	"	99 57	E H D	25 1	W H D
♂	"	182 27	E H D	4 13	W H D
♂	Sets	13 46	W H D	148 58	E H D
♂	"	52 29	W H D	63 39	E H D

SCHEDULE VI.—T P L's for the moderation of the excess of A D

DBs in order	Constant T P L of S A of D B at Birth S A of D B after Crossing				D B Rises or Sets
☿	86° 41	93° 19'			Rises
♀	72	50	107	10	"
♂	71	36	103	24	"
♂	59	9	120	51	"
♂	56	48	123	12	"
♂	62	29	117	31	"
♂	93	20	86	40	"
♂	81	22	98	38	Sets
♂	58	4	121	56	"

The following eight problems illustrate all the principles and methods enunciated in Articles 18 to 26

Problem 1—Find the A Ds less than  $90^\circ$  of all the direct mundane directions of Venus to M C.

$\nu$  to M C E H D =  $19^\circ 41'$

Cl D =  $\text{III } 19^\circ 41'$  S D Unrect =  $\text{III } 19^\circ 41'$  A E s Decrease from S D till  $\delta$   
D B is Below A E s are Nocturnal till D B Rises

1st A E is Nocturnal and just Less than S D i.e.  $\text{III } 0^\circ 0' = \text{Square } \square$

[1]  $\nu$   $\square$  M C A D =  $\text{III } 19^\circ 41' - \text{III } 0^\circ 0' = 19^\circ 41'$

Nov A D equals H D D B Rises, and A E s become Diurnal

[2]  $\nu$   $\odot$  M C A D =  $19^\circ 41' + 21^\circ 26' = 41^\circ 7'$

[3]  $\nu$   $\star$  M C A D =  $41^\circ 7' + 14^\circ 17' = 55^\circ 24'$

[4]  $\nu$   $\angle$  M C A D =  $55^\circ 24' + 17^\circ 52' = 73^\circ 16'$

Problem 2—Find the A Ds less than  $90^\circ$  of all the direct mundane directions of Mars to M C

$\delta$  to M C E H D =  $99^\circ 57'$  Cl D =  $\text{VII } 16^\circ 38'$  S D Rect =  $\text{IV } 4^\circ 11'$

A E s Increase from S D till  $\delta$

D B is Below A E s are Nocturnal till D B Rises

1st A E is Nocturnal and just Greater than S D i.e.

$\text{IV } 10^\circ 24' = \text{Sesquisquare } \square$

[1]  $\delta$   $\square$  M C A D =  $\text{IV } 10^\circ 24' - \text{IV } 4^\circ 11' = 6^\circ 13'$

[2]  $\delta$   $\pm$  M C =  $6^\circ 13' + 6^\circ 15' = 12^\circ 28'$

[3]  $\delta$   $\times$  M C =  $12^\circ 28' + 4^\circ 10' = 16^\circ 38'$

[4]  $\delta$   $\rho$  M C =  $16^\circ 38' + 20^\circ 50' - 37^\circ 28'$

[5]  $\delta$   $\times$  M C =  $37^\circ 28' + 20^\circ 50' = 58^\circ 18'$

[6]  $\delta$   $\pm$  M C =  $58^\circ 18' + 4^\circ 10' = 62^\circ 28'$

[7]  $\delta$   $\square$  M C =  $62^\circ 28' + 6^\circ 15' - 68^\circ 43'$

[8]  $\delta$   $\Delta$  M C =  $68^\circ 43' + 10^\circ 24' = 79^\circ 7'$

Problem 3—Find the A Ds less than  $90^\circ$  of all the direct mundane directions of Mercury to Horizon

$\nu$  to Hor E H D =  $27^\circ 41'$  Cl D =  $\text{I } 3^\circ 49'$  S D Unrect =  $\text{I } 3^\circ 49'$

A E s Decrease from S D till  $\delta$

D B is Below A E s are Nocturnal till D B Rises

1st A E is Nocturnal and just Less than S D i.e.  $\text{I } 0^\circ 0' = \text{Semi sextile } \propto$

[1]  $\nu$   $\propto$  Hor A D =  $\text{I } 3^\circ 49' - \text{I } 0^\circ 0' = 3^\circ 49'$

[2]  $\nu$   $\delta$  Hor =  $3^\circ 49' + 23^\circ 52' = 27^\circ 41'$

A D equals H D D B Rises A E s become Diurnal

[3]  $\nu$   $\propto$  Hor A D =  $27^\circ 41' + 36^\circ 8' = 63^\circ 49'$

[4]  $\nu$   $\angle$  Hor =  $63^\circ 49' + 18^\circ 4' = 81^\circ 53'$

Problem 4—Find the A Ds less than  $90^\circ$  of all the direct mundane directions of Jupiter to Horizon

$\propto$  to Hor W H D =  $52^\circ 29'$  Cl D =  $\text{VIII } 13^\circ 46'$  S D Rect =  $\text{III } 5^\circ 35'$

A E s Increase from S D till  $\delta$

D B is Above A L A are Diurnal till D B sets

1st A E is Diurnal and just Greater than S D i.e.  $v 0^{\circ} 0' = \text{Tripe } \Delta$

- (1)  $\gamma \Delta$  Hor—  $D = v 0^{\circ} 0'$  or iii  $19^{\circ} 21' - iii 5^{\circ} 33' = 13^{\circ} 46'$   
 (2)  $\gamma \square$  Hor—  $= 13^{\circ} 46' + 9^{\circ} 41' = 23^{\circ} 27'$   
 (3)  $\gamma \pm$  Hor—  $= 23^{\circ} 27' + 5^{\circ} 49' = 29^{\circ} 16'$   
 (4)  $\gamma \pi$  Hor—  $= 29^{\circ} 16' + 3^{\circ} 52' = 33^{\circ} 8'$   
 (5)  $\gamma \theta$  Hor—  $= 33^{\circ} 8' + 19^{\circ} 21' = 52^{\circ} 29'$

Problem 5—Find the A D's less than  $90^{\circ}$  of all the direct mundane directions of Venus to Neptune

$\gamma$  to  $\psi$  E. H D =  $19^{\circ} 41'$  Cl D =  $\alpha i 19^{\circ} 41' + 23^{\circ} 10'$  mod to S N A. of D B  $\gamma$

$86^{\circ} 41' 23^{\circ} 10' 72^{\circ} 50'$  mod C D B of  $\psi$

$057307 + 039274 = 096601$  T P L. of  $19^{\circ} 23'$

Cl D =  $\alpha i 33^{\circ} 9' = \alpha i 14^{\circ} 52'$  S D Unrect =  $14^{\circ} 52'$

A E's Decrease from S D till  $\theta$

D B is Below A E's are Nocturnal till D B Rises.

1st A L is 2 oct and just Less than S D i.e.  $0^{\circ} 0' = \text{Conjunction } \theta$

- (1)  $\gamma \theta \psi$  A D =  $14^{\circ} 52' - 0^{\circ} 0' = 14^{\circ} 52'$

- (2)  $\gamma \propto \psi$   $-14^{\circ} 52' + 24^{\circ} 17' = (32^{\circ} 9')$

A D Exceeds H D by  $19^{\circ} 28'$  D B Rises Moderate

$72^{\circ} 50' 19^{\circ} 28' 107^{\circ} 10'$  mod. Excess

$983227 + 096601 = 079828$  T P L. of  $28^{\circ} 38'$

A D =  $19^{\circ} 41' + 28^{\circ} 38' = 48^{\circ} 19'$

- (3)  $\gamma \angle \psi$   $= 48^{\circ} 19' + 17^{\circ} 51' = 66^{\circ} 10'$

- (4)  $\gamma * \psi$   $= 66^{\circ} 10' + 17^{\circ} 52' = 84^{\circ} 2'$

Problem 6—Find the A D's less than  $90^{\circ}$  of all the direct mundane directions of Saturn to Neptune

$\gamma$  to  $\psi$  W H D =  $13^{\circ} 46'$  Cl D =  $v 13^{\circ} 46' + 23^{\circ} 10'$  mod to S D A of D B  $\gamma$

$86^{\circ} 41' 23^{\circ} 10' 81^{\circ} 2'$  mod C, D B of  $\psi$

$057307 + 034483 = 091790$  T P L. of  $21^{\circ} 45'$

Cl D =  $v 35^{\circ} 31' - v 1^{\circ} 8' 24'$  S D Rect =  $v 18^{\circ} 43'$

A E's Increase from S D till  $\theta$

D B is Above A E's are Diurnal till D B sets.

1st A E's is Diurnal and just Greater than S D i.e.  $v 1^{\circ} 0' 0' = \text{Opposition } \theta$ ,

- (1)  $\gamma \theta \psi$  A D  $v 1^{\circ} 0' 0'$  or  $v 27^{\circ} 7' - v 18^{\circ} 43' = 8^{\circ} 24'$

- (2)  $\gamma \pi \psi$   $8^{\circ} 24' + 27^{\circ} 7' = (35^{\circ} 31')$

A D Exceeds H D by  $21^{\circ} 45'$  D B sets Moderate.

$81^{\circ} 22' 21^{\circ} 45' 98^{\circ} 38'$  mod. Excess

$991642 + 091790 = 083432$  T P L. of  $26^{\circ} 22'$

A D  $13^{\circ} 46' + 26^{\circ} 22' = 40^{\circ} 8'$

- (3)  $\gamma \pm \psi$   $40^{\circ} 8' + 6^{\circ} 34' = 46^{\circ} 42'$

- (4)  $\gamma \square \psi$   $46^{\circ} 42' + 9^{\circ} 52' = 56^{\circ} 34'$

- (5)  $\gamma \Delta \psi$   $56^{\circ} 34' + 16^{\circ} 26' = 73^{\circ} 0'$

Problem 7—Find the A D's less than  $90^{\circ}$  of all the direct mundane directions of Jupiter to the Sun

4 to O W H D  $52^{\circ} 29'$  Cl D  $=v_1 13^{\circ} 46' + 0^{\circ} 11'$  mod to S D A of D B  $\propto$   
 $59^{\circ} 9' 0'' 11' 58^{\circ} 4'$  mod S D B of O  
 $250871 + 0.49135 = 300006$  T P L. of  $0^{\circ} 11'$   
 Cl D  $v_1 13^{\circ} 57'$  S D Rect  $v 5^{\circ} 24'$

A E s Increase from S D till  $\theta$  ~

D B is Above A E s are Diurnal till D B sets

1st A E is Diurnal and just Greater than S D i.e.  $v_1 0^{\circ} 0' =$  Opposition  $\theta$

[1]  $\propto \theta$  O A D  $=v_1 0^{\circ} 0'$  or  $v 19^{\circ} 21' - v 5^{\circ} 24' = 13^{\circ} 57'$

[2]  $\propto \propto$  O  $13^{\circ} 57' + 19^{\circ} 21' = 33^{\circ} 18'$

[3]  $\propto \pm$  O  $33^{\circ} 18' + 3^{\circ} 52' = 37^{\circ} 10'$

[4]  $\propto \square$  O  $37^{\circ} 10' + 5^{\circ} 49' = 42^{\circ} 59'$

[5]  $\propto \Delta$  O  $42^{\circ} 59' + 9^{\circ} 41' = (52^{\circ} 40')$

Now A D Exceeds H D by  $0^{\circ} 11'$  D B sets Moderate

$58^{\circ} 4' 0'' 11' 121^{\circ} 56'$  mod. Excess.

$967780 + 300006 = 267786$  T P L of 0 23

A D  $=52^{\circ} 29' + 0^{\circ} 23' = 52^{\circ} 52'$

Problem 8—Find the A D s less than  $90^{\circ}$  of all the mundane directions of the Moon to Uranus

D to  $\propto$  E H D  $182^{\circ} 27'$  Cl D  $=11 26^{\circ} 54' + 2^{\circ} 22'$  mod to S N A D B D

$56^{\circ} 48' 2^{\circ} 22' 93^{\circ} 20'$  mod. C. D D of  $\propto$

$138022 + 0.28524 = 166546$  T P L of  $3^{\circ} 53'$

Cl D  $=11 30^{\circ} 47'$  S D Unrect  $=11 30^{\circ} 47'$

A E s Decrease from S D till  $\theta$

D B Below A. E s are Nocturnal till D B rises

1st A E is Nocturnal and just Less than S D i.e.  $11 12^{\circ} 27' =$  Quintile Q

[1] D Q  $\propto$  A D  $=11 30^{\circ} 47' 11 12^{\circ} 27' = 18^{\circ} 20'$

[2] D  $\propto$   $\propto$   $18^{\circ} 20' + 12^{\circ} 27' = 30^{\circ} 47'$

[3] D  $\angle$   $\propto$   $30^{\circ} 47' + 15^{\circ} 33' = 46^{\circ} 20'$

[4] D  $\propto$   $\propto$   $46^{\circ} 20' + 15^{\circ} 33' = 61^{\circ} 53'$

Exercise 9—Prepare the schedule of the birth CDB s and CDF s of every SP moderated to S.A. of each DB for the standard nativity

Exercise 10—Prepare the schedule of the Clockwise and the Anti clockwise Shorter Distances from every DB to every SP for the standard nativity

Exercise 11—Prepare the schedule of all the Aspect Extents both on the diurnal and the nocturnal scale of every DB for the standard nativity

Exercise 12—Prepare the schedule of the appropriate E.H.D. and W.H.D. of every DB for the standard nativity

Exercise 13—Prepare the schedule of the T.P.L. s of the ratios of the birth S.A. to the other S.A. of every DB for the standard nativity

Exercise 14—Calculate the A D s of all the direct directions of every Body to M.C. in the standard nativity

Exercise 15—Calculate the A D s of all the direct directions of every Body to the Horizon in the standard nativity

Exercise 16—Calculate the A D s of all the direct directions of Mars to every SP in the standard nativity

Exercise 17—Calculate the A D s of all the direct directions of Neptune to every SP in the standard nativity

Exercise 18—Calculate the A D s of all the direct directions of Jupiter to every SP in the standard nativity

Exercise 19—Calculate the A.D.s of all the direct directions of Uranus to every SP in the standard nativity

Exercise 20—Calculate the A.D.s of all the direct directions of Venus to every SP in the standard nativity

Exercise 21—Calculate the A.D.s of all the direct directions of the Sun to every SP in the standard nativity

Exercise 22—Calculate the A.D.s of all the direct directions of Moon to every SP in the standard nativity

Exercise 23—Calculate the A.D.s of all the direct directions of Saturn to every SP in the standard nativity

Exercise 24—Calculate the A.D.s of all the direct directions of Mercury to every SP in the standard nativity

Exercise 25—Calculate the A.D.s of all the converse directions of every Body to MC in the standard nativity

Exercise 26—Calculate the A.D.s of all the converse directions of every Body to the Horizon in the standard nativity

Exercise 27—Calculate the A.D.s of all the converse directions of Mercury to every SP in the standard nativity

Exercise 28—Calculate the A.D.s of all the converse directions of Saturn to every SP in the standard nativity

Exercise 29—Calculate the A.D.s of all the converse directions of Moon to every SP in the standard nativity

Exercise 30—Calculate the A.D.s of all the converse directions of the Sun to every SP in the standard nativity

Exercise 31—Calculate the A.D.s of all the converse directions of Venus to every SP in the standard nativity

Exercise 32—Calculate the A.D.s of all the converse directions of Uranus to every SP in the standard nativity

Exercise 33—Calculate the A.D.s of all the converse directions of Jupiter to every SP in the standard nativity

Exercise 34—Calculate the A.D.s of all the converse directions of Neptune to every SP in the standard nativity

Exercise 35—Calculate the A.D.s of all the converse directions of Mars to every SP in the standard nativity

## 27 Determination of the A. D. of a Body directed to a given Aspect—

The first arc of direction after birth and then the subsequent arcs of direction may be determined in as rapid a succession as may be convenient, till the required aspect is reached, as described in Articles 19 to 25. But if one wants to calculate straight the arc of direction to any particular aspect, then he has to adopt the same rules with a few modifications. Firstly, find the clockwise [anti-clockwise] and the shorter distance as described in Articles 19 and 20. Secondly, take the A.E. on the scale of the S.A. of D.B. at birth (see Art. 22). The given aspect may be of the decreasing or increasing series, and the D.B. may be anti-clockwise or clockwise [clockwise or anti-clockwise] of the SP. So we have the following four cases—

Case A,	D.B. Anti-clockwise [Clockwise], and aspect of Decreasing series			
" B,	"	"	"	Increasing series.
" C,	"	Clockwise [Anti-clockwise]	"	Increasing series
" D,	"	"	"	Decreasing series.

For example, in the series of direct directions of Mars to MC worked out in Problem 2, the aspects prior to opposition are of the increasing series and the very same aspects subsequent to opposition are of the decreasing series

Thirdly, determine the AD with the aid of

Rule XIV—In Case A,	$AD = SD - AE.$	$\{x_{11} - (SD + AE)\}$
„ B,	$AD = SD + AE$	$\{AE - SD\}$
„ C,	$AD = AE - SD$	$\{SD + AE\}$
„ D,	$AD = x_{11} - (SD + AE.)$	$\{SD - AE\}$

Next you should convert the AD obtained into its equivalent degrees and minutes by taking the integral number of houses in it on the scale of the SA. of the DB at the commencement of the direction. Fourthly, find the appropriate H.D. of the DB, that is, the EHD [WHD] if it is below its horizon, and the WHD [EHD,] if it is above its horizon (see Art 24). Now, if the AD. in degrees and minutes does not exceed the appropriate EHD or WHD of the DB, then the AD obtained in degrees and minutes is the arc of direction. But if the AD exceeds the EHD or WHD, then the excess of AD over EHD or WHD should be moderated to the semi arc of the DB other than the one at the beginning of the direction. In such a case, the sum of the EHD or WHD and the moderated excess is the AD in degrees and minutes

Problem 9—Find the AD in the Direct direction of the Sun to its Decreasing mundane Quintile of the Meridian

Q QMC—EHD of Q is  $39^{\circ} 15'$

Clockwise Unrect SD between Q and MC is  $14^{\circ} 19' 32''$

DB is below its horizon at birth

Noct AE. of the Quintile of Q is  $11^{\circ} 7' 53''$

DB is Anti clockwise and the Aspect is of Decreasing series

Case A  $AD = SD - AE.$

$$= 14^{\circ} 19' 32'' - 11^{\circ} 7' 53'', = 11^{\circ} 39'$$

DB is below its ho and its one noct house is  $19^{\circ} 43'$

$$AD \ 11^{\circ} 39' = 2 \times 19^{\circ} 43' + 11^{\circ} 39' = 51^{\circ} 5'$$

AD exceeds HD by  $51^{\circ} 5' - 39^{\circ} 15' = 11^{\circ} 50'$  the excess  $11^{\circ} 50'$  should be moderated to SDA of Q —

$$59^{\circ} 9' - 120^{\circ} 51' - 11^{\circ} 50' \text{ moderated excess}$$

$$968971 (\text{Sch } \sqrt{1}) + 118217 - 0.81788 \text{ TPL of } 24^{\circ} 11'$$

$$AD = 39^{\circ} 15' + 24^{\circ} 11' - 63^{\circ} 26'$$

Problem 10—Find the AD in the Direct direction of Uranus to its Increasing mundane Semi square of Mercury

$\frac{1}{2} \angle \frac{1}{2}$  EHD of  $\frac{1}{2}$  is  $54^{\circ} 26'$

Clockwise Unrect. SD between  $\frac{1}{2}$  and  $\frac{1}{2}$  is  $1^{\circ} 13' 32''$

DB is below its horizon at birth

Noct. AE. of the Semi square of  $\frac{1}{2}$  is  $1^{\circ} 9' 28''$



DB is Anti-clockwise, and the aspect is of Decreasing series

Case B  $A.D = S.D + A.E$

$$= 13^{\circ} 32' + 1^{\circ} 9' 28'' = 14^{\circ} 23' 0''$$

DB is below its hor and its one noct house is  $18^{\circ} 56'$ .

$$A.D, 14^{\circ} 23' 0'' = 2 \times 18^{\circ} 56' + 23^{\circ} 0'' = 60^{\circ} 52'$$

A.D exceeds H.D by  $60^{\circ} 52' - 54^{\circ} 26'$ , i.e.  $6^{\circ} 26'$ , the excess,  $6^{\circ} 26'$ , should be moderated to S.D.A. of  $\mu$  —

$$56^{\circ} 48' : 123^{\circ} 12' :: 6^{\circ} 26' \text{ moderated excess.}$$

$$966374 + 144634 = 1^{\circ} 11058 \text{ T.P.L. of } 13^{\circ} 57'$$

$$A.D = 54^{\circ} 26' + 13^{\circ} 57' = 68^{\circ} 23'$$

Problem 11—Find the D.B. in the Direct direction of Neptune to its Increasing mundane Quintile of Mercury

$\Psi$   $\odot$   $\gamma$  E.H.D. of  $\Psi$  is  $5^{\circ} 44'$

Clockwise Rect. S.D. between  $\Psi$  and  $\gamma$  is  $0^{\circ} 27' 48''$

DB is below its horizon at birth

Noct. A.E. of the Quintile of  $\Psi$  is  $11^{\circ} 34'$

DB is Clockwise, and the Aspect is of Increasing series.

Case C  $A.D = A.E - S.D$

$= 11^{\circ} 34' - 0^{\circ} 27' 48'' = 10^{\circ} 28' - 0^{\circ} 27' 48''$ , for  $\Psi$  is below its hor, and its one noct. house is  $28^{\circ} 54'$

A.D  $= 12^{\circ} 40'$

For the same reason,  $A.D = 23^{\circ} 54' + 12^{\circ} 40' = 41^{\circ} 34'$

A.D exceeds H.D by  $41^{\circ} 34' - 5^{\circ} 44'$ , i.e.,  $35^{\circ} 50'$ , the excess  $35^{\circ} 50'$ , should be moderated to S.D.A. of  $\Psi$  —

$$86^{\circ} 41' 93^{\circ} 19' 35^{\circ} 50' \text{ moderated excess}$$

$$996797 + 070099 = 0.66896, \text{ T.P.L. of } 38^{\circ} 35'$$

$$A.D = 5^{\circ} 44' + 38^{\circ} 35' = 44^{\circ} 19'$$

Problem 12—Find the D.B. in the Direct direction of the Sun to its Decreasing mundane Sesqui square of Saturn

$\odot$   $\square$   $\gamma$ —E.H.D. of  $\odot$  is  $39^{\circ} 15'$ .

Clockwise Rect. S.D. between  $\odot$  and  $\gamma$  is  $11^{\circ} 10' 12''$

DB is below its horizon at birth

Noct. A.E. of the Sesqui-square of  $\odot$  is  $11^{\circ} 9' 51''$ ,

DB is Clockwise, and the Aspect is of Decreasing series

Case D  $A.D = \text{H.D} - (S.D + A.E)$

$= 11^{\circ} 10' 12'' + 11^{\circ} 9' 51'' = 22^{\circ} 19' 43'' - 11^{\circ} 0' 20''$ , for  $\odot$  is below its hor and its one noct. house is  $19^{\circ} 43'$

$$A.D = 11^{\circ} 19' 23''$$

For the same reason  $A.D = 19^{\circ} 23' - 2 \times 19^{\circ} 43' + 19^{\circ} 23' = 58^{\circ} 49'$

A.D exceeds H.D by  $58^{\circ} 49' - 39^{\circ} 15'$  i.e.  $19^{\circ} 34'$ , the excess  $19^{\circ} 34'$  should be moderated to S.D.A. of  $\odot$  —

$$59^{\circ} 9' : 120^{\circ} 51' :: 19^{\circ} 34' \text{ moderated excess.}$$

$$968971 + 096376 = 0.65347, \text{ T.P.L. of } 39^{\circ} 59'$$

$$A.D = 39^{\circ} 15' + 38^{\circ} 59' = 78^{\circ} 14'$$

Exercise 36—Find the A.D. in the Direct direction of Mars to the Decreasing mundane Conjunction of Saturn in the standard nativity

Exercise 37—Find the A.D. in the Direct direction of Jupiter to the Increasing mundane Sextile of itself in the standard nativity

Exercise 38—Find the A.D. in the Direct direction of the Sun to the Decreasing mundane Square of Uranus in the standard nativity

**28 Determination of the Mundane Aspect of a given A D**—The determination of an aspect given the arc, that is, the determination of the aspect whose influence will be felt at a particular age in an individual's life, is just the converse of the problem described in the previous article. As before find the appropriate horizontal distance of the directed body, and the shorter distance rectified or unrectified, between the directed body and the stationary position. Now, if the A.D. is given in years and months convert them into degrees and minutes at the rate of one degree per year, and if it is given in ordinal number of years, e.g., the 58th year then take the mid point, i.e.  $57\frac{1}{2}$  years and convert it into degrees and minutes. But if the A.D. is given in degrees and minutes take them as they are. After converting, if necessary, the given arc of direction, into degrees and minutes we should see if it exceeds the appropriate horizontal distance of the D.B. If it does not exceed take it as it is, and if it exceeds, inversely moderate the excess to the semi arc of the directed body at birth, for the excess obtained is on the scale of its other semi arc. Then take the sum of the horizontal distance and the inversely moderated excess as the given A.D. Next, convert the new A.D. found in degrees and minutes into its equivalent houses, degrees and minutes, taken on the scale of the S.A. of the directed body at birth. There are the same four cases as those stated in Article 27 and the A.E. on the birth scale is determined with the aid of

**Rule XV**—In Case A,  $AE = SD - AD$   $[x_{11} - (SD + AD)]$   
 Case B  $AE = AD - SD$   $[AD + SD]$   
 Case C  $AE = AD + SD$   $[AD - SD]$   
 Case D,  $AE = x_{11} - (SD + AD)$   $[SD - AD]$

Now that A.E. is known the corresponding Aspect may be read from Schedule IV

**Problem 13**—Find the Decreasing Direct mundane aspect of the Sun to the Meridian, relating to the 64th year in George V's life

Given 64th year is approximately equal to A.D. 63 30

E.H.D. of  $\odot$  is  $39^\circ 15'$

Clockwise Unrect. S.D. between  $\odot$  and M.C. is iv 19 32

Given A.D.  $63^\circ 30'$  exceeds H.D. by  $24^\circ 15'$  the excess should be moderated inversely as follows —

120 51 59 9 24 15 moderated excess.

1 31029 + 087056 = 118085 T.P.L. of  $11^\circ 51'$

A.D. becomes  $39^\circ 15' + 11^\circ 51' = 51^\circ 7'$  which should be taken as nocturnal for the excess has been moderated to S.A. of  $\odot$

$\odot$  D.  $51^\circ 7' - 2 \times 19^\circ 43' + 11^\circ 41'$  for one noct. house of  $\odot$  is  $19^\circ 43'$

A.D. = ii  $11^\circ 41'$

**Exercise 39**—What is the Increasing Direct mundane aspect of Venus to Sun that operates in the 68th year in the standard nativity

**Exercise 40**—What is the Decreasing Direct mundane aspect of Saturn to Jupiter that operates in the 37th year in the standard nativity

**Exercise 41**—What is the Increasing Direct mundane aspect of Neptune to Uranus that operates in the 72nd year in the standard nativity

**29 Relation between primary mundane directions to the Meridian and those to the Horizon**—It will be seen that the A D's of a D B to mundane aspects of the Meridian and to those of the Horizon are identically the same and the corresponding aspects though different in name bear a definite relation to one another. The relations may be ascertained from the schedule below

**Schedule VIII**—The Relation between the Directions to the two Angles

To one	To the other	To one	To the other	To one	To the other
♄	□	♆	♄ or ♀	□	♄ or ♀
♂	♄ or ♆	□	♆ or ♄	♂	♆ or ♄
♆	♂ or ♀	♄	♂ or ♄	♆	♂

So if the A D of an aspect, other than the quintile and the biquintile of a body to one of the Angles is known, we can readily state the aspect of the body to the other angle, having the same A D with the aid of

**Rule XVI**—When the mundane aspect of a body to an Angle is given, to obtain the mundane aspects of the body to the other Angle, to the given mundane aspect of a body to an Angle add three houses, and if necessary, cast off 6 houses from the sum and also deduct the given mundane aspect from 9 houses, and if necessary, cast off 6 houses from the remainder. The reader may verify the rule by comparing the A D's in the following directions to the two Angles—

Dir to Merid or	Dir to Hor	Arc	Dir to Merid or	Dir to Hor	Arc
♄ □ M C	♄ ♀ Hor	= 5° 44	♄ ♀ M C	♄ □ Hor	= 89° 7
♄ ♀ M C	♄ ♂ Hor	= 36 50	♄ ♂ M C	♄ ♀ Hor	= 13 46
♄ ♂ M C	♄ ♀ Hor	= 67 57	♄ ♀ M C	♄ ♂ Hor	= 46 39
♄ ♀ M C	♄ ♄ Hor	= 19 41	♄ ♄ M C	♄ ♀ Hor	= 63 5
♄ ♄ M C	♄ ♀ Hor	= 73 16	♄ ♀ M C	♄ ♄ Hor	= 79 31
♄ ♄ M C	♄ ♂ Hor	= 3 49	♄ ♂ M C	♄ ♄ Hor	= 13 47
♄ ♄ M C	♄ ♀ Hor	= 9 34	♄ ♀ M C	♄ ♄ Hor	= 23 28
♄ ♀ M C	♄ ♀ Hor	= 16 34	♄ ♀ M C	♄ ♀ Hor	= 33 8

Since the A D's in a corresponding pair of directions to the two Angles are identically the same, except in regard to the Quintile series those to M C alone may be calculated. As the two of a pair are inseparables their combined effect may be read in regard to the directions to M C

**Contention II**—The Arcs of Directions to the Horizon need not be calculated

## LESSON III

### MUNDANE PARALLEL

**30 Primary Directions to the Mundane Parallel.**—Two points are in mundane parallel when they are one on each side of the same meridional half or on the same side of opposite meridional halves, with the ratios between their semi arcs and their distances from the same or opposite meridional half equal. These two kinds of parallels constitute two different types as will be seen presently. In directions to parallel as in those to aspects of the position of bodies, only one body is moved to the parallel of its own position at birth or to that of another body at birth, but never to the parallel of an angle. The DB may be moved clockwise resulting in direct mundane parallels or anti-clockwise resulting in converse mundane parallels.

**31 The Different Types of Mundane Parallels**—The definition of a mundane parallel given in Article 30, admits of four patterns of mundane parallels, shown in Figure V

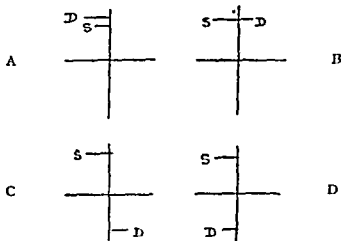


Fig V—A DB and SP are on the same side of meridian and horizon  
 B. DB and SP are on the opposite sides of meridian and the same side of horizon  
 C DB and SP are on the opposite sides of the meridian and horizon  
 D DB and SP are on the same sides of meridian and opposite sides of horizon

Figure V—A is nothing but mundane conjunction, and Figure V—C, is nothing but mundane opposition so these two patterns of mundane parallel should be ruled out, as otherwise one and the same aspect will receive two different names, and so will tend to convey different significance. Figure V—B is indisputably a mundane parallel upon the meridian and Figure V—D may be taken to be a mundane parallel but it is evidently more a parallel upon the horizon than upon the meridian. Though some writers do question these parallels upon the horizon, I shall discuss their calculation as well, and leave it to the reader to adopt them or not. I shall speak of the former as Mundane Parallels of Type No 1, and of the latter as Mundane Parallels of Type No 2. Therefore, we have

**Rule XVII**—Mundane parallels of Type 1 are formed with the DB and the SP on opposite sides of the meridian but on the same side of the horizon and those of Type 2 are formed with the DB and the SP on the same side of the meridian but on opposite sides of the horizon.

In other words those of Type 1 are upon the same meridional half, and those of Type 2 are upon opposite meridional halves, shutting out what really are conjunctions and oppositions.

**32 Primary Directions to Mundane Parallels**—In these directions one of the nine celestial bodies is the DB, and the position at birth of one of the nine celestial bodies is the SP. At birth only a very few or no pairs of bodies are in mundane parallel. But the diurnal rotation of the heavens shifts bodies causing them to move clockwise through the mundane quadrants in succession. During this clockwise rotation, a DB is brought to occupy a distance proportionate to its semi arc, either from the other side of the same meridional half to that of SP, or from the same side of the opposite meridional half as that of SP. Again, in direct mundane parallels the arc of direction is the clockwise angle from the DB to its position at the parallel and in converse mundane parallels it is the anti-clockwise angle from the DB to its position at parallel.

**33 The Meridional Half of Parallel**—Since the position of a body at birth is fixed and since the DB should come to parallel either on the same meridional half as the stationary position or on the opposite meridional half to it, therefore, the meridional half of parallel (MHP) will be either on the same side of the horizon as the stationary position as in Type 1 or on the opposite side of the horizon as in Type 2. Therefore we have,

**Rule XVIII**—The meridional half of parallel in Type 1 is the one on the same side of the horizon as the stationary position at birth and in Type 2 is the one on the side of the horizon opposite to that occupied by the SP at birth.

**34 The Meridional Distance of DB**—We have seen in Article 32 that the AD is measured from the position of the DB at birth to the position of

D.B. at parallel, and both the positions are expressed in distance from the meridian of parallel. So, we have to take (i) the M.D. of D.B. at birth, and (ii) the M.D. of D.B. at parallel, in both cases from the M.H.P. In Type 1 the M.D. of D.B. at birth is taken similar, diurnal or nocturnal, to the S.P. And the M.D., diurnal or nocturnal, of S.P. is taken according as it is above or below its horizon; for the M.H.P. is similar to S.P. at birth. In Type 2 the M.D. of D.B. at birth is taken opposite to the S.P. at birth, for the M.H.P. is opposite to the S.P. So we have,

**Rule XIX.**—In Type 1 the birth M.D. of D.B. is to be taken similar to that of S.P. at birth, and in Type 2 it is to be taken opposite to that of S.P. at birth. It should be evident that the first or birth M.D. of D.B., to be spoken of hereafter as merely the M.D. of D.B., is similar to the M.H.P. in both the Types.

**35. Moderation of the Meridional Distance of the Stationary Position.**—In Article 30 it was stated that in mundane parallels, the ratio between the S.A. and the M.D. of D.B. should be equal to that between the S.A. and the M.D. of S.P. To find the meridional distance of the D.B. at which the two ratios would be equal, we have to moderate the meridional distance of the S.P. from the meridional half of parallel to the semi-arc of the D.B. at parallel. So we have to find the S.A. of D.B. at parallel, and to moderate the birth M.D. of S.P. to it. In Type 1, the M.H.P. is similar to the S.P. at birth, so S.A. of D.B. is to be taken similar to S.A. of S.P. at birth, e.g., both are to be taken alike, diurnal or nocturnal. In Type 2, M.H.P. is opposite to S.P. at birth, so S.A. of D.B. is to be taken opposite to S.A. of S.P. at birth, which is the S.A. of D.B. at parallel. So we have,

**Rule XX.**—In Type 1, the S.A. of D.B. at parallel is taken similar to S.A. of S.P. at birth, and in Type 2, it is taken opposite to S.A. of S.P. at birth. Now the birth M.D. of S.P. is to be moderated to the S.A. of D.B. at parallel :—  
Birth S.A. of S.P. Birth M.D. of S.P. S.A. of D.B. at parallel mod. M.D. of S.P.  
For example, in the direct mundane parallel, Type 1, of Neptune to Jupiter, S.P. is diurnal, so the M.H.P. and the S.A. of D.B. are both diurnal. The S.A. of S.P. is  $58^{\circ} 4'$ , its M.D.  $5^{\circ} 35'$ , S.D.A. of Neptune is  $93^{\circ} 19'$ . So, moderate as :—

$58^{\circ} 4' : 5^{\circ} 35' :: 93^{\circ} 19', \text{ moderated M.D. of S.P.}$   
 $1^{\circ}17'03 + 0^{\circ}28'531 = 1^{\circ}30234, \text{ T.P.L. of } 8^{\circ} 58'$ , which is the moderated M.D. of S.P.  
Again in the direct mundane parallel, Type 2, of Saturn to Jupiter, S.P. is diurnal, so the M.H.P. and S.A. of D.B. are nocturnal. The S.A. of S.P. at birth is  $58^{\circ} 4'$  and its M.D.  $5^{\circ} 35'$ , and S.N.A. of Saturn is  $98^{\circ} 38'$ . So moderate as :—

$58^{\circ} 4' : 5^{\circ} 35' :: 98^{\circ} 38', \text{ moderated M.D. of S.P.}$   
 $1^{\circ}01'00 + 0^{\circ}26'125 = 1^{\circ}27828, \text{ T.P.L. of } 9^{\circ} 29'.$  Therefore, we have,

**Rule XXI.**—Moderate birth M.D. of S.P. :—

Birth S.A. of S.P. : Birth M.D. of S.P. : : S.A. of D.B. at  $t$  : mod. M.D. of S.P.

**35. The Arc of Direction.**—It was stated in Article 34 that to find the A.D. we have to take (i) the M.D. of D.B. at birth and (ii) the M.D. of D.B. at parallel which is nothing but the moderated M.D. of S.P. discussed in Article 35. Let us now proceed to determine the A.D. The various possible permutations of the birth positions of D.B.'s and those of S.P.'s in Type 1, may be grouped under four heads ;—

- (i) when D.B. crosses the M.H.P. (see Fig. VI A and VII A) ;
- (ii) when D.B. crosses the M.H. opposite to M.H.P. (see Fig. VI B and VII B) ;
- (iii) when D.B. does not cross the M.H.P. (see Fig. VI C & D, and VII C & D) ;
- (iv) when D.B. crosses both M. H.'s. (see Fig. VI E & F and VII E & F).

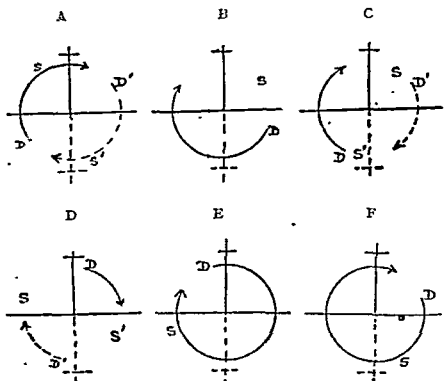


Fig VI—Direct Mundane Parallels of Type 1.

In each figure the M.H.P. is indicated by a straight line and the M.H. opposite to the M.H.P. by a dotted line.

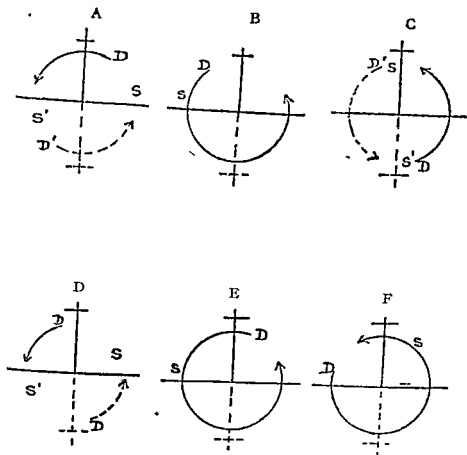


Fig VII—Converse Mundane Parallels of Type 1

In each figure the MHP is indicated by a straight line and the MH, opposite to the MHP by a dotted line

And the various possible permutations of the birth positions of D, B, and P in Type 2, may be grouped under similar four heads —

- (i) When DB crosses the MHP (see Fig VIII A and IX A)
- (ii) When DB crosses the MH opposite to MHP (see Fig VIII B and IX B)
- (iii) When DB does not cross the MHP (see Fig. VIII C & D and IX C and D)
- (iv) When DB crosses both MH's (see Fig VIII E & F and IX E & F)



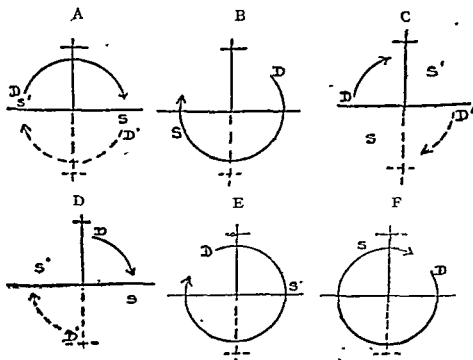


Fig. VIII—Direct Mundane Parallels of Type 2.—The lines as in Figures VI and VII.

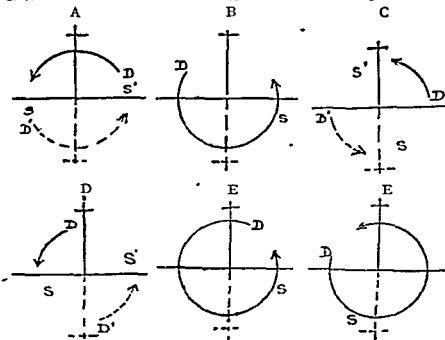


Fig. IX—Converse Mundane Parallels of Type 2.—The lines as in Figures VI and VII.

The arcs of direction i.e., the angular measurements of the arcs running clockwise [anti clockwise] from DB at birth to DB at parallel, in these several cases of both direct and converse mundane parallels of both Types 1 and 2, are found with the aid of the following formulae —

Type 1 Direct and Converse, and Type 2 Direct and Converse

- (1)  $AD = \text{Birth MD of DB from MHP} + \text{moderated MD of SP}$
- (2)  $AD = 360^\circ - (\text{Birth MD of DB from MHP} + \text{mod MD of SP})$
- (3)  $AD = \text{Birth MD of DB from MHP} \sim \text{moderated MD of SP}$
- (4)  $AD = 360^\circ - (\text{Birth MD of DB from MHP} \sim \text{moderated MD of SP})$

As (birth MD of DB from MHP + moderated MD of SP) and, much more therefore, (birth MD of DB from MHP  $\sim$  moderated MD of SP) will at the most be not more than  $270^\circ$ , therefore,  $360^\circ - (\text{birth MD of DB from MHP} + \text{moderated MD of SP})$  and  $360^\circ - (\text{birth MD of DB from MHP} \sim \text{moderated MD of SP})$  will never be less than  $90^\circ$ , and so the parallels of groups (2) and (4) will not fall within the span of 90 years. Therefore, parallels falling under groups (2) and (4) may be omitted from calculations. And so both direct and converse mundane parallels of either Type 1 or Type 2 may be sorted under groups 1 and 3 which shall be spoken of as Cases (i) and (ii) of both Types 1 and 2. Therefore, we have

**Rule XXII**—In Type 1 and Type 2 of both direct and converse mundane parallels of Case (i), where DB crosses the MHP,

$AD = \text{Birth MD of DB from MHP} + \text{moderated MD of SP}$

And in Type 1 and Type 2, of both direct and converse mundane parallels of Case (ii), where DB does not cross the MHP,

$AD = \text{Birth MD of DB from MHP} \sim \text{moderated MD of SP}$

**Problem 17**—Find the AD in the direct mundane parallel, Type 1, of Moon to Mars

The MHP is the lower meridional half

▷ the DB crosses the MHP

The birth MD of ♀ from LMH is  $89^\circ 7'$  and its SNA is  $93^\circ 20'$

The birth MD of ♂ from LMH is  $37^\circ 28'$  and its SNA is  $62^\circ 29'$

Therefore moderate as follows —

$62^\circ 29' + 37^\circ 28' = 99^\circ 57'$  moderated MD of ♂

$0.22212 + 0.28524 = 0.50736$  TPL of  $55^\circ 58'$

Case (i)  $AD = 89^\circ 7' + 55^\circ 58' = 145^\circ 5'$  (late)

**Problem 18**—Find the AD in the direct mundane parallel, Type 1, of Neptune to Jupiter

The MHP is the upper meridional half ♀ the DB does not cross the MHP

The birth MD of ♀ from UMH is  $99^\circ 3'$  and its SDA is  $93^\circ 19'$

The birth MD of ♀ from UMH is  $5^\circ 35'$  and its SDA is  $58^\circ 4'$

The sgn  $\sim$  means deduct the less term from the greater

## DIRECTIONAL CALCULATIONS

58° 4' 5" 35      93° 9'      moderated MD of  $\mu$

1 01703 + 0 28531 = 1 30234 TPL of 8° 58'

Case (ii) AD = 99° 3' - 8° 58' = 90° 5' (late)

**Problem 19**—Find the AD in the direct mundane parallel Type 1 of Uranus to Mars

The MHP is the lower meridional half  $\mu$  the DB does not cross the MHP

The birth MD of  $\mu$  from LMH is 2° 22' and its SNA is 56° 48'

The birth MD of  $\delta$  from LMH is 37° 28' and its SNA, is 62° 29'

62° 29' - 37° 28' = 25° 01' moderated MD of  $\delta$

Case (ii) AD = 34° 4' - 2° 22' = 31° 42'

To calculate the AD's of isolated mundane parallels it will do to prepare a schedule of the ternary proportional logarithms of the ratios of the SA of SP's at birth to their birth MD's and to note the TPL's of SDA's and SNA's of DB's

Schedule IX—The TPL's of SA of SP MD of SP

S. P's in their order in the nativity	Constant TPL of S A of SP at birth Its MD at birth	TPL of SDA of DB	TPL of SNA of DB
$\psi$	86° 41' 80° 57' 0 02972	93° 19' 0 28531	86° 41' 0 31734
$\gamma$	72° 50' 53° 9' 0 13683	107° 10' 0 22541	72° 50' 0 39294
$\pi$	71° 36' 43° 55' 0 21228	108° 24' 0 22024	71° 36' 0 40036
O	59° 9' 19° 54' 0 47310	120° 51' 0 17303	59° 9' 0 48332
$\mu$	56° 48' 2° 22' 1 38022	123° 12' 0 16466	56° 48' 0 50092
$\delta$	62° 29' 37° 28' 0 22212	117° 31' 0 18517	62° 29' 0 45951
$\nu$	93° 20' 89° 7' 0 02007	86° 40' 0 31742	93° 20' 0 28524
$\gamma$	81° 22' 67° 36' 0 08050	81° 22' 0 34483	98° 38' 0 26125
$\mu$	58° 4' 5" 35 1 01703	58° 4' 0 49135	121° 56' 0 16915

Schedule X—M.D. of S.P.'s moderated to S.D.A. or S.N.A of D.B.

S.P.'s.	S.N.A. or S.D.A.	D.B.'s								
		☿	♈	♊	☉	♊	♋	♌	♍	♎
☿	D	87° 9'	100° 5'	101° 14'	112° 52'	115° 3'	109° 45'	80° 56'	75° 59'	54° 14'
	N	80 57	68 1	66 52	55 14	53 3	58 21	87 10	92 7	113 52
♈	D	68 6	78 12	79 6	88 11	89 54	85 45	63 15	59 22	42 22
	N	63 15	53 9	52 15	43 10	41 27	45 36	68 6	71 59	88 59
♊	D	57 14	65 44	66 29	74 7	75 34	72 5	53 9	49 54	35 37
	N	53 10	44 40	43 55	36 17	34 50	38 19	57 15	60 30	74 47
☉	D	31 23	36 3	36 28	40 39	41 27	39 32	29 9	27 22	19 32
	N	29 10	24 30	24 5	19 54	19 6	21 1	31 24	33 11	41 1
♊	D	3 53	4 28	4 31	5 2	5 8	4 54	3 37	3 23	2 25
	N	3 37	3 2	2 59	2 28	2 22	2 36	3 53	4 7	5 5
♋	D	55 57	64 16	65 0	72 28	73 52	70 28	51 58	48 47	34 49
	N	51 59	43 40	42 56	35 28	34 4	37 28	55 58	59 9	73 17
♌	D	89 6	102 20	103 30	115 23	117 38	112 12	82 45	77 41	55 26
	N	82 46	69 32	68 22	56 29	54 14	59 40	89 7	94 11	116 26
♍	D	77 32	89 2	90 4	100 24	102 21	97 39	72 0	67 36	48 15
	N	72 1	60 31	59 29	49 9	47 12	51 54	77 33	81 57	101 18
♎	D	8 58	10 18	10 25	11 37	11 51	11 18	8 20	7 49	5 35
	N	8 20	7 0	6 53	5 41	5 27	6 0	8 58	9 29	11 43

Exercise 32—Find the A.D. in the direct mundane parallel, Type 1, of Sun to Venus in the standard nativity

Exercise 33—Find the A.D. in the direct mundane parallel, Type 1, of Mars to Jupiter in the standard nativity

Exercise 34—Find the A.D. in the direct mundane parallel, Type 2 of Neptune to Sun in the standard nativity

Exercise 35—Find the A.D. in the converse mundane parallel, Type 1, of Neptune to itself in the standard nativity

Exercise 36—Find the A.D. in the converse mundane parallel, Type 1, of Uranus to Saturn in the standard nativity

Exercise 37—Find the A.D. in the converse mundane parallel Type 2, of Moon to Mars in the standard nativity

37. Determination of A.D.'s in the mundane parallels of all bodies to different S.P.'s—In the primary directions of bodies to mundane aspects of angles and bodies we may take the bodies one by one as the directed body, as D.B.'s play the leading part. But in the primary directions of all bodies to the mundane parallels of the positions of bodies we may better take the stationary positions of bodies one by one, as the S.P.'s play the leading part. First, note whether the stationary position is above or below its horizon, and in Type 1 take the birth S.A. and M.D. of the S.P. and the S.A. of D.B. similar to S.P., and moderate the birth M.D. of S.P. to the similar S.A. of D.B. and in Type 2 take the birth S.A. and M.D. of S.P. also as at birth, but the S.A. of D.B. opposite to S.A. of S.P., and moderate the M.D. of S.P. to the opposite S.A. of D.B. Now, see if D.B. has to cross or not the M.H.P. to parallel the S.P., accordingly settle whether the parallel is of Case (i) or (ii), and proceed to find the A.D. applying Rule XXII. In most cases it can be readily judged by mere inspection whether a D.B. has to cross or not the M.H.P. without actually carrying out all the tedious moderations. So a schedule of M.D.'s of S.P.'s only for cases when D.B. has to cross or not the M.H.P. need be moderated to the particular S.A. of D.B. All the same, in Schedule X the M.D.'s of every S.P. stand moderated to both S.D.A. and S.N.A. of every D.B.

Exercise 38—Prepare the schedule of the birth M.D.'s of S.P.'s moderated to (a) S.D.A. and (b) S.N.A. of every D.B. in the standard nativity

## LESSON IV

### RAPT PARALLEL

**38 Rapt Parallel**—In all directions described till now, only one body was moved while the other remained stationary. But in a direction to rapt parallel both the bodies are simultaneously moved while the equatorial arc between them remains the same. Angles do not form rapt parallel. The equatorial arc with a body at its either end may be compared to a garland with a pendant at each end. Two bodies are said to be in rapt parallel when they stand at distances from a meridional half, proportionate to their SAs appropriate to the MH. A rapt parallel is a primary direction since it is formed within 24 sidereal hours after birth, and is caused by the apparent diurnal rotation of the heavens. And it is a mundane direction because the arc of direction is measured upon the equatorial arc. In direct rapt parallel the arc is moved clockwise to the meridional half of parallel and in converse rapt parallel the arc is moved anticlockwise to the meridional half of parallel.

**39 Direct Body and the Passive Body**—The two bodies concerned in a rapt parallel are known as the Directed Body (DB) and the Passive Body (PB), there being no SP. In a direct rapt parallel the directed body is the one at the anticlockwise end of the equatorial arc and in a converse rapt parallel it is the one at the clockwise end of the equatorial arc. In either case the body at the other end of the equatorial arc is the passive body. The DB always pushes before it the PB but never drags the PB.

**40 Arc of Parallel**—In a rapt parallel the equatorial arc between the DB and the PB is the arc of parallel (AP) for it is the one that is moved clockwise [anticlockwise] to the meridional half of parallel (MHP). In direct rapt parallel, the arc of parallel is measured clockwise from DB to PB and in converse rapt parallel, anticlockwise from DB to PB. Since the AD obtained, with one arc paralleled upon an MHP is identically the same as the AD obtained with the other arc paralleled upon the other MHP, therefore it will do if one and only one of the two arcs between a DB and a PB, which are the complements of one another is taken—the clockwise arc from DB to PB in direct ones and the anticlockwise arc from DB to PB in converse ones. The angular measurement in equatorial degrees of the clockwise AP is obtained by deducting the right ascensional degrees and minutes of PB from the right ascensional degrees and minutes of DB and the measurement of the anticlockwise AP in converse ones by deducting the RA of DB from

the R A of P B If the R A to be deducted from is numerically less than that of the other, add  $360^\circ$  to it and then deduct

**Dictum III**—When the angle to be deducted from is numerically less than the other, add  $360^\circ$  to it

But whether the difference is more than  $180^\circ$  or not, leave it as it is with no rectification

So Dictum II does not apply here For, we want only the clockwise or anti clockwise arc but not the shorter distance the aspect being a parallel and not an angular one For example, in the direct rapt parallel of Saturn to Sun the R A of Saturn is  $203^\circ 16'$  and the R A of Sun is  $70^\circ 58'$ , and so the A P is  $203^\circ 16' - 70^\circ 58'$ , i.e.,  $132^\circ 18'$ , and in the converse rapt parallel of Neptune to Mars, the R A of Neptune is  $9^\circ 55'$  and the R A of Mars is  $128^\circ 20'$ , so the A P is  $128^\circ 20' - 9^\circ 55'$ , i.e.,  $118^\circ 25'$ . Therefore we have

**Rule XXIII**—In direct rapt parallels,  $AP = RA \text{ of } DB - RA \text{ of } PB$   
Add  $360^\circ$  to the R A to be deducted from if it is numerically less

In converse ones  $AP = RA \text{ of } PB - RA \text{ of } DB$

**41 Meridional Half of Parallel**—In direct rapt parallels, D B is moved to its first clockwise M.H (Case i) and if no rapt parallel is formed on the first clockwise M.H, the D B is moved continuously or in the same clockwise manner to its second clockwise M.H (Case ii) In converse rapt parallels, the D B is moved to its first anti-clockwise M.H (Case i) and if no rapt parallel is formed on the first anti clockwise M.H., the D B is moved continuously or in the same anti clockwise manner to its second anti-clockwise M.H (Case ii) For example, in the direct rapt parallel of Saturn to Sun the first clockwise M.H is L.M.H, and the second clockwise M.H is the U.M.H and in the converse rapt parallel of Neptune to Mars the first anti clockwise M.H is the L.M.H and the second anti clockwise M.H is the U.M.H Therefore, we have

**Rule XXIV**—In Case (i) of direct and converse rapt parallels, the M.H.P is the first clockwise or anti clockwise M.H of D B in Case (ii) of direct and converse rapt parallels the M.H.P is the second clockwise or anti clockwise M.H of D B

**42 The First M.D of D B**—In direct rapt parallels the mundane distance at birth of the D B from its first or second clockwise M.H, as the case may be is the first M.D of D B In converse rapt parallels the mundane distance at birth of the D B from its first or second anti clockwise M.H, as the case may be is the first M.D of D B For example in the direct rapt parallel of Saturn to Sun, in Case (i), the first M.D of Saturn is its L.M.D  $112^\circ 24'$ , and in Case (ii) the first M.D of Saturn is its U.M.D  $67^\circ 36'$  In the converse rapt parallel of

Neptune to Mars of Case (i) the first MD of Neptune is its LMD  $80^{\circ} 57'$ , and of Case (ii) the first MD of Neptune is its UMD  $99^{\circ} 3'$ . Therefore, we have

**Rule XXV**—The first MD of DB is always the birth MD of DB taken appropriate to the MHP

**43 The Second MD of DB**—In direct rapt parallels the mundane distance at parallel of the DB from its MHP is the second MD of DB. In converse rapt parallels the mundane distance at parallel of the DB from its MHP is the second MD of DB. It is obtained in both direct and converse rapt parallels by dividing the AP proportionately to the SAs of DB and of PB at parallel. The division is carried out as follows—

SA of DB at  $\parallel$  + SA of PB at  $\parallel$  SA of DB at  $\parallel$  AP 2nd MB of DB

For example in the direct rapt parallel of Saturn to Sun the first clockwise MH is LMH, the sum of the SNAs of Saturn and Sun is  $98^{\circ} 38' + 59^{\circ} 9'$ , i.e.,  $157^{\circ} 47'$  the SNA of Saturn is  $98^{\circ} 38'$ , and the AP is  $132^{\circ} 18'$  (see Schedule XI)

$157^{\circ} 47' \quad 98^{\circ} 38' \quad 132^{\circ} 18'$  the second MD of DB

(a.c.)  $994279 + 026125 + 013371 - 033775$  TPL of  $82^{\circ} 42'$

The second MD of DB is  $82^{\circ} 42'$

Again in the direct rapt parallel of Neptune to Mars the first clockwise MH is UMH, the sum of the SDAs of Neptune and Mars is  $93^{\circ} 19' + 117^{\circ} 31'$  i.e.  $210^{\circ} 50'$  the SDA of Neptune is  $93^{\circ} 19'$  and the AP is  $241^{\circ} 35'$  (see Schedule XI)

$210^{\circ} 50' \quad 93^{\circ} 19' \quad 241^{\circ} 35'$  the second MD of DB from UMH

$21^{\circ} 5' \quad 93^{\circ} 19' \quad 24^{\circ} 9.5'$  the second MD of DB

(a.c.)  $906867 + 028531 + 087221 - 022619$  the TPL of  $106^{\circ} 56'$  the second MD

One tenth of the first and the third term have been taken to bring their values below  $180^{\circ}$  for which only TPL's are given in the Tables (see Articles 51 and 200 of Mathematical Astrology). Therefore we have

**Rule XXVI**—In all cases the second MD of DB is obtained as—  
SA of DB at  $\parallel$  + SA of PB at  $\parallel$  SA of DB at  $\parallel$  AP 2nd MD of DB

**44 Arc of Direction**—The arc of direction is the equatorial arc through which DB is moved clockwise in direct or anticlockwise in converse rapt parallels from its mundane position at birth to its mundane position at parallel. It is the arc from first MD to second MD from MHP. In Case (i) of both direct and converse rapt parallels the first MD of DB is greater than the second MD of DB and the AD is obtained by deducting the second MD of DB from the first MD of DB (see Fig XA and XI A). And in Case (ii) of both direct and converse rapt parallels the first MD of DB is less than the second MD of DB and the AD is obtained by deducting the sum of the first



MD of DB and the second MD of DB from  $360^\circ$ , (see Fig X B and XI B) For example, in the direct rapt parallel of Saturn to Sun the first MD of Saturn is  $112^\circ 24'$ , and the second MD of Saturn is  $82^\circ 42'$ .

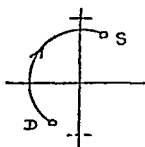


Fig. X A

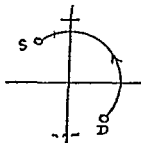


Fig. XI A

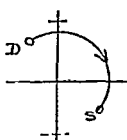


Fig. X B

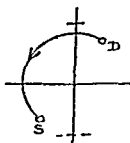


Fig. XI B

D rect - Rapt Parallels.—Converse

Case (i) A.D.  $112^\circ 24' - 82^\circ 42' = 29^\circ 42'$

And in the direct rapt parallel of Neptune to Mars the first MD of Neptune is  $99^\circ 3'$  and the second MD of Neptune is  $106^\circ 56'$ . As the first MD of DB is less than the second MD of DB, the parallel is upon the second clockwise MH or LMH. So a fresh moderation has to be made appropriate to the LMH as follows: the sum of the SNAs of Neptune and Mars is  $86^\circ 41' + 62^\circ 29'$ , i.e.,  $149^\circ 10'$ ; the SNA of Neptune is  $86^\circ 41'$  and the AP the same  $241^\circ 35'$  (see Schedule XI) —

$149^\circ 10' + 86^\circ 41' = 241^\circ 35'$  the second MD of DB from LMH

$14^\circ 55' + 86^\circ 41' = 24^\circ 95'$  the second MD of DB

(a.c.)  $8.91840 + 0.31734 + 0.87221 = 0.10795$  T.P.L. of  $140^\circ 23'$

The second MD of DB is  $140^\circ 23'$  and the first MD or LMD of Neptune is  $80^\circ 57'$

Case (ii) A.D.  $= 360^\circ - (80^\circ 57' + 140^\circ 23') = 360^\circ - 221^\circ 20' = 138^\circ 40'$

The A.D. is beyond the span settled upon and so the rapt parallel will be late in life. Therefore, we have

To facilitate the calculation of all rapt parallels, a schedule containing (i) the R.A.'s of bodies with the difference in R.A. between two consecutive bodies, (ii) both the S.A.'s of every body, noting the birth ones, and (iii) both the M.D.'s of every body, noting the birth ones, may be preliminary prepared, (see schedule XI).

Schedule XI—The R.A.'s, S.A.'s and M.D.'s of Bodies.

Bodies.	R A.	Diff. of R.A.	S.A.		M.D.	
			Diur.	Noct.	Upper	Lower
☿	9° 55'	104° 38'	93° 19'	88° 41'	99° 3'	80° 57'
♀	37 43	27 48	107 10	72 50	126 51	53 9
♂	46 57	9 14	108 24	71 36	136 5	43 55
☿	70 58	24 1	120 51	59 9	160 6	19 54.
♂	88 30	17 32	123 12	56 48	177 38	2 22
♂	128 20	39 50	117 31	62 29	142 32	37 28
♂	179 59	51 39	86 40	93 20	90 53	89 7
♂	203 16	23 17	81 22	98 38	67 38	112' 24
♂	265 17	62 1	58 4	121 56	5 35	174 25

N. B.—The birth S.A.'s and M.D.'s are set in thick types in the schedule.

Exercise 39—Prepare a schedule of the R.A.'s, S.A.s and M.D.'s of bodies in the standard nativity .

Problem 20—Find the A D. of the direct rapt parallel of Uranus to Mars.

The Cl. D. or A P. from Uranus to Mars =  $360^\circ + 88^\circ 30' - 128^\circ 20' = 320^\circ 10'$ .

The first clockwise M.H.P. is U.M.H.

First M.D. of D.B. is the U.M.D. of Uranus at birth =  $177^\circ 38'$ .

S.D.A. of Uranus + S.D.A. of Mars =  $123^\circ 12' + 117^\circ 31' = 240^\circ 43'$ .

$240^\circ 43' : 123^\circ 12' :: 320^\circ 10' : \text{the second M.D. of D.B.}$

$120^\circ 21'5 : 123^\circ 12' :: 160^\circ 5' :$

..

(a.c.)  $9'82520 + 0'16466 + 0'05093 = 0'04079$ , T.P.L. of  $163^\circ 52'$ .

Case (i)  $AD = 177^\circ 38' - 163^\circ 52' = 13^\circ 46'$

$AD$  of  $\epsilon$  R P  $\epsilon$  (Dir) is  $13^\circ 46'$

Problem 21—Find the  $AD$  of the direct rapid parallel of Venus to Mars

The  $CD$  or  $AP$  from Venus to Mars  $= 360^\circ + 37^\circ 43' - 128^\circ 20' = 269^\circ 23'$

The First  $CD$   $MH$  is  $UMH$

First  $MD$  of  $DB$  is the  $UMD$  of Venus  $= 126^\circ 51'$

$SNA$  of Venus  $+ SNA$  of Mars  $= 107^\circ 10' + 117^\circ 31' = 224^\circ 41'$

$224^\circ 41' - 107^\circ 10' - 269^\circ 23'$  the second  $MD$  of  $DB$

$112^\circ 20' 5'' - 107^\circ 10' - 134^\circ 41' 5''$

(a c)  $9.79527 - 0.22571 + 0.12593 = 0.14641$  T.P.L. of  $128^\circ 29'$

First  $MD$  of  $DB$  is less, so parallel afresh on the second  $CD$   $MH$  or  $L$   $MH$

$AP$  is same i.e.  $269^\circ 23'$

The first  $MD$  of  $\epsilon$  is its  $LMD$   $53^\circ 9'$

$SNA$  of Venus  $+ SNA$  of Mars  $= 72^\circ 50' + 62^\circ 29' = 135^\circ 19'$

$135^\circ 19' - 72^\circ 50' - 269^\circ 23'$  the second  $MD$  of  $DB$  from  $MHP$

$67^\circ 39' 5'' - 72^\circ 50' - 134^\circ 41' 5''$  ,

(a c)  $9.57505 + 0.39294 + 0.12593 = 0.09392$  T.P.L. of  $145^\circ 0'$

Case (ii)  $AD = 360^\circ - (53^\circ 9' + 145^\circ 0') = 161^\circ 51'$

$AD$  of  $\epsilon$  R P  $\epsilon$  (Dir) is  $161^\circ 51'$ , which will be late

Exercise 40—Find the  $AD$ s of all the direct rapid parallels of Mars to all other bodies in the standard nativity

Exercise 41—Find the  $AD$ s of all the converse rapid parallels of Saturn to all other bodies in the standard nativity

## LESSON V

### PRIMARY ZODIACAL DIRECTIONS

**46 Primary Zodiacal Directions**—Primary zodiacal directions are called primary, for they are formed within 24 sidereal hours after birth, and so earlier than the secondary directions to be taken up next. Primary zodiacal directions are on all fours so far as they can be, with the primary mundane directions, except in regard to certain points. The most outstanding difference is that primary zodiacal directions rest on the phenomenon of the anti clockwise annual motion of bodies, while the primary mundane directions rest on that of the clockwise apparent diurnal rotation of the heavens. Though primary zodiacal directions rest on anti clockwise annual motion of bodies yet (1) their zodiacal motion is taken to be at the rate of the apparent diurnal rotation of the heavens, and (2) arcs of directions are measured upon the ecliptic and then referred to the equator, and are made to measure time similarly to primary mundane directions. So the aspects are first measured upon the ecliptic and then referred to the equator. Theoretically speaking, primary zodiacal directions may be to the position of one of the two angles or of a body, to zodiacal parallel and to zodiacal rapt parallel.

**47 Primary Zodiacal Directions of the Angles and to the Bodies**—In primary mundane directions to angles, the latter are deemed to be the S P 's and the bodies to be the D B s. But in primary zodiacal directions, the angles are deemed to be the D B s and the bodies to be the S P 's. So in primary zodiacal directions of angles, the angles are written first e.g., M C  $\Delta$  O while in primary mundane directions the angles are written second, e.g., O  $\Delta$  M C. And in primary zodiacal directions of bodies to aspects of positions of bodies, the bodies, as usual are the D B s and the positions are the S P s. Subject to this difference, and the consequent alterations, primary zodiacal directions of angles, and those to bodies may be discussed together as it was done in the case of mundane directions.

**48 Direct and Converse Directions**—The phenomenon underlying primary zodiacal directions being the anti clockwise annual motion of bodies, all directions in which the D B s, whether an angle or a body, are moved anti clockwise are the direct ones, and those in which the D B are moved clockwise are the converse ones.

**49 Shorter Distance**—In direct directions we require the anti clockwise zodiacal distance from D.B (angle or body) to S.P., and in converse ones the clockwise zodiacal distance from D B to S.P. The anti clockwise zodiacal dis

tance in direct directions is obtained by deducting the D B.'s celestial longitude from the S P.'s celestial longitude. The clockwise zodiacal distance in converse ones is obtained by deducting the S P.'s longitude from D B.'s longitude. When the longitude to be deducted from is numerically less than the other, add  $360^\circ$  to it and then deduct. For example, the anti-clockwise distance in the direct direction of Jupiter to Neptune is  $360^\circ 0' + 10^\circ 10' - 265^\circ 40'$ , i.e.,  $104^\circ 30'$  and the clockwise distance in the converse one of M C. to Sun is  $270^\circ 47' - 72^\circ 26'$ , i.e.,  $198^\circ 21'$ . Therefore, we have

**Rule XXVIII**—Anti clockwise distance from D B. to S P. =  $S P. - D B.$

Clockwise distance from D B. to S P. =  $D B. - S P.$

And when the longitude to be subtracted from is less than the other, add  $360^\circ$  to it and then deduct

But we require always the shorter distance between D B. and S P., for all aspect angles are less than  $180^\circ$ . The shorter distance is the anti clockwise or clockwise distance itself when it does not exceed  $180^\circ$ , but when it exceeds  $180^\circ$ , the shorter distance is always obtained by deducting the anti clockwise or clockwise distance from  $360^\circ$ . For example, the anti clockwise distance from Jupiter to Neptune being  $104^\circ 30'$ , is itself the S D., but the clockwise distance from M C. to Sun being  $198^\circ 21'$ , the shorter distance from M C. to Sun is  $360^\circ 0' - 198^\circ 21'$ , i.e.,  $161^\circ 39'$ . Therefore, we have,

**Rule XXIX**— $S D. = Acl D \text{ or } Cl D$ , when the latter is less than  $180^\circ$

$S D. = 360^\circ - Acl D \text{ or } Cl D$ , when the latter is greater than  $180^\circ$ .

When the anti clockwise or clockwise distance has not been rectified to obtain the shorter distance, the direction, whether direct or converse, is one of Case (i) and when the anti clockwise or clockwise distance has been rectified to obtain the shorter distance, the direction, whether direct or converse, is one of Case (ii)

**50. The First Aspect Angle and the Subsequent Ones**—In Case (i) of direct and converse ones, that is, when the anti clockwise or clockwise distance has not been rectified to obtain the shorter distance, the first aspect angle is just less than the shorter distance, and the subsequent ones decrease till conjunction and then increase. In Case (ii) of direct and converse ones, that is, when the anti clockwise or clockwise distance has been rectified to obtain the shorter distance, the first aspect angle is just greater than the shorter distance, and the subsequent ones increase till opposition and then decrease. For example, in the direct directions of Jupiter to Neptune the unrectified shorter distance is  $104^\circ 30'$ , so the first aspect angle is the one just less than the S D., i.e., square or  $90^\circ$ , and the subsequent ones decrease from square up to conjunction, and then they increase, e.g., sextile to conjunction, and then to sextile, square and so on. And in

the direct direction of the MC to Moon the rectified shorter distance is  $89^{\circ} 44'$ , so the first aspect angle is the one just greater than the SD, i.e., square or  $90^{\circ}$ , and the subsequent ones increase from trine up to opposition, and then they decrease, e.g., trine to opposition, and then trine, square and so on. Therefore we have,

**Rule XXX**—In Case (i) the first aspect angle is just less than SD, and the subsequent ones decrease till conjunction, and then increase

In Case (ii), the first aspect angle is just greater than SD, and the subsequent ones increase till opposition, and then decrease

**§1 The Position of the DB at the end of a Direction**—Aspect angles are the zodiacal aspect extents. They are always measured from the SP's towards the DB's as in primary mundane directions; but clockwise in direct ones and anti clockwise in converse ones. The point where the measurement ends is termed the limit or the position of the DB at the end of the direction. In direct directions the limit will be anti clockwise of the DB, and in converse ones it will be clockwise of the DB.

Whether SD has been obtained by rectification or not, (1) in direct directions the limit of an aspect from opposition to conjunction, i.e., of the decreasing series, is the SP's longitude minus the aspect angle, (2) in direct directions the limit of an aspect from conjunction to opposition, i.e., of the increasing series, is the SP's longitude plus the aspect angle, (3) in converse ones the limit of an aspect from opposition to conjunction, i.e., of the decreasing series, is the SP's longitude plus the aspect angle, and (4) in converse ones the limit of an aspect from conjunction to opposition, i.e., of the increasing series, is the SP's longitude minus the aspect angle.

For example, (1) in the direct direction of Jupiter to the decreasing square of Neptune, the limit is the zodiacal point  $360^{\circ} 0' + 10^{\circ} 10' - 90^{\circ} 0'$ , i.e.,  $280^{\circ} 10'$  (2) in the direct direction of MC to the increasing square of Moon, the limit is the zodiacal point  $181^{\circ} 3' + 90^{\circ} 0'$ , i.e.,  $271^{\circ} 3'$  (3) in the converse direction of Uranus to the decreasing sextile of Neptune, the limit is the zodiacal point  $10^{\circ} 10' + 60^{\circ}$ , i.e.,  $70^{\circ} 10'$  and (4) in the converse direction of the Ascendant to the increasing square of Uranus, the limit is the zodiacal point  $360^{\circ} 0' + 88^{\circ} 37' - 90^{\circ} 0'$ , i.e.,  $358^{\circ} 37'$ . Therefore, we have

**Rule XXXI**—In Cases i and ii of a direction,

(1) in direct ones to a decreasing and in converse ones to an increasing aspect,

Limit's long = SP's long — Aspect Angle

(2) in direct ones to an increasing and in converse ones to a decreasing aspect,

Limit's long = SP's long + Aspect Angle

The limits have always to be taken with no latitude that is as if they were ecliptic points, in calculating their RAs, OAs, SAs and MDs required for determining the ADs in the different kinds of primary zodiacal directions, a subject to be discussed presently (see Schedule \V)

**52 The Arc of Direction in directions of the Angles**—So far, the description applies in common to directions of MC Ascendant, and Bodies to the positions of bodies But from this point the methods vary

Whether the direction is of Case (i) or (ii) (1) in direct ones of MC, to the positions of bodies, the AD is the limit's RA minus the DB's (MC's) RA (2) in converse ones of MC, the AD is the DB's (MC's) RA minus the limit's RA (3) in direct ones of the Ascendant to the positions of bodies, the AD is the limit's OAH (Oblique Ascension when at the horizon see Mathematical Astrology Art 100) minus the Ascendant's OAH and (4) in converse ones of the Ascendant the AD is the Ascendant's OAH minus the limit's OAH For example, in the direct directions of the Meridian to Moon the AD is limit's RA or  $271^{\circ} 9'$ —MC's RA or  $270^{\circ} 52'$ , i.e.,  $0^{\circ} 17'$  and in the converse direction of the Ascendant to Jupiter (where the clockwise distance is  $360^{\circ} + 2^{\circ} 3' - 265^{\circ} 40'$ , i.e.,  $96^{\circ} 23'$ , the first aspect is Ascendant square Jupiter, and the limit  $265^{\circ} 40' + 90'$ , i.e.,  $355^{\circ} 40'$  the AD is the Ascendant's OAH or  $0^{\circ} 52'$  minus the limit's OAH or  $358^{\circ} 10'$ , i.e.,  $2^{\circ} 42'$  Therefore we have

**Rule XXXII**—In both Cases (i) and (ii),

- (1) In the direct direction of MC,  $AD = \text{Limit's RA} - MC's RA$   
In the converse directions of MC,  $AD = MC's RA - \text{Limit's RA}$
- (2) In the direct directions of the Ascendant,  $AD = \text{Limit's OAH} - \text{Asc's OAH}$   
In the converse ones of the Ascendant  $AD = \text{Asc's OAH} - \text{Limit's OAH}$

**53 The Arc of Direction in directions of Bodies**—First, take the birth MD of the directed body taken with latitude, from the meridional half appropriate to the limit Next moderate the MD of the limit to the SA of the directed body taken with latitude and appropriate to the limit Therefore, we have

**Rule XXXIII**—Take the limit with no latitude and moderate its MD to the SA of the DB taken with latitude and appropriate to the SA of the limit—

Limit's SA limit's MD SA of DB mod MD of limit

In the directions of bodies also two cases arise as the DB crosses or not its first MH —

- (i) when the directed body has not to cross its first anti clockwise meridional half in direct directions [first clockwise MH in converse ones] to reach the limit (see Fig XII A and XIII A)

(ii) when the directed body has to cross its first anti clockwise meridional half in direct directions [first clockwise MH in converse ones] to reach the limit (see Fig XII B and XIII B)

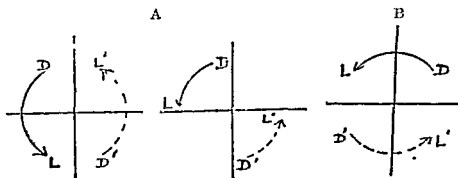


Fig XII—Direct Primary Zodiacal Directions.

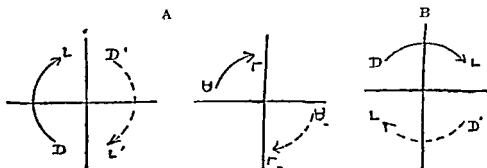


Fig XIII—Converse Primary Zodiacal Directions.

(1) In the direct directions of Mars to Moon the Acl D is  $55^{\circ} 28'$  which is the unrectified SD, the first AE is the decreasing conjunction, and the first limit is  $181^{\circ} 3'$ , so Mars the DB, has not to cross its first anti clockwise MH to reach the limit (Case i) The limits SNA is  $90^{\circ} 31'$ , and its LMD is  $90^{\circ} 6'$ , and the SNA of Mars taken with latitude is  $62^{\circ} 29'$ , and its LMD  $37^{\circ} 28'$

$90^{\circ} 31' - 90^{\circ} 6' - 62^{\circ} 29'$  moderated MD of the limit

$000201 + 045951 = 046152$ , TPL of  $62^{\circ} 12'$ .

Mars the DB, when taken with latitude, its LMD is  $37^{\circ} 28'$

A D =  $62^{\circ} 12' - 37^{\circ} 28' = 24^{\circ} 44'$ , Case (i)

The A.D of the direct  $\delta \delta$  is  $24^{\circ} 44'$

(2) In the converse direction of Uranus to Neptune, the Cl D is  $78^{\circ} 27'$  which is the unrectified SD, the first AE is the decreasing sextile and the first limit is  $70^{\circ} 10'$ , so Uranus, the DB, has not to cross its first clockwise



MH to reach the limit (Case i) The limit SNA is  $59^{\circ} 43'$ , and its LMD  $22^{\circ} 20'$ , and the SNA of Uranus taken with latitude is  $56^{\circ} 48'$ , and its LMD  $2^{\circ} 22'$

$59^{\circ} 43' \quad 22^{\circ} 20' \quad 56^{\circ} 48'$  moderated MD of the limit

$0.42714 + 0.50092 = 0.92806$ , TPL of  $21^{\circ} 15'$

$AD = 21^{\circ} 15' - 2^{\circ} 22' = 18^{\circ} 53'$

The AD of the converse  $\psi * \psi$  is  $18^{\circ} 53'$

(3) In the direct direction of Venus to Uranus, the Acl D is  $48^{\circ} 58'$  which is the unrectified SD, the first AE is the decreasing conjunction and the first limit is  $88^{\circ} 37'$  so Venus the DB, has not to cross its first anti clockwise MH to reach the limit (Case i) The limit SNA is  $57^{\circ} 9'$ , and its LMD  $2^{\circ} 22'$ , and the SNA of Venus taken with latitude is  $72^{\circ} 50'$ , and its LMD  $53^{\circ} 9'$

$57^{\circ} 9' \quad 2^{\circ} 22' \quad 72^{\circ} 50'$  moderated MD of the limit

$1.38288 + 0.39794 = 1.77582$  TPL of  $3^{\circ} 1'$

$AD = 53^{\circ} 9' - 3^{\circ} 1' = 50^{\circ} 8'$

The AD of the direct  $\psi \delta H$  is  $50^{\circ} 8'$

(4) In the converse direction of Moon to Mars the Cl D is  $55^{\circ} 28'$  which is the unrectified SD the first AE is the decreasing conjunction, and the first limit is  $125^{\circ} 35'$  so Moon the DB, has not to cross its first clockwise MH to reach the limit (Case i) The limit SNA is  $64^{\circ} 41'$ , and its LMD  $37^{\circ} 5'$ , and the SNA of Moon taken with latitude is  $93^{\circ} 20'$ , and its LMD  $89^{\circ} 7'$

$64^{\circ} 41' \quad 37^{\circ} 5' \quad 93^{\circ} 20'$  moderated MD of the limit

$0.24161 + 0.28574 = 0.52685$  TPL of  $52^{\circ} 31'$

$\bullet \quad AD = 89^{\circ} 7' - 52^{\circ} 31' = 36^{\circ} 36'$

The AD of the converse  $D \delta \delta$  is  $36^{\circ} 36'$

(5) In the direct direction of Jupiter to Neptune the Acl D is  $104^{\circ} 30'$  which is the unrectified SD, the first AE is the decreasing square and the first limit is  $280^{\circ} 10'$ , so Jupiter, the DB has to cross its first anti clockwise MH to reach the limit (Case ii) The limit SDA is  $57^{\circ} 50'$ , and its UMD  $10^{\circ} 12'$ , and the SDA of Jupiter taken with latitude is  $58^{\circ} 4'$  and its UMD  $5^{\circ} 35'$

$57^{\circ} 50' \quad 10^{\circ} 12' \quad 58^{\circ} 4'$  moderated MD of the limit

$0.75358 + 0.49135 = 1.24493$  TPL of  $10^{\circ} 14'$

$AD = 10^{\circ} 14' + 5^{\circ} 35' = 15^{\circ} 49'$

The AD of the direct  $\psi \alpha \psi$  is  $15^{\circ} 49'$

(6) In the converse direction of Mars to Uranus the Cl D is  $36^{\circ} 58'$  which is the unrectified SD the first AE is the decreasing conjunction and the first limit is  $83^{\circ} 37'$  so Mars the DB, has to cross its first clockwise MH to

reach the limit (Case ii). The limits S N A is  $57^{\circ} 9'$ , and its L<sup>1</sup> D  $2^{\circ} 22'$  and the S N A. of Mars taken with latitude is  $62^{\circ} 25'$ , and its L<sup>1</sup> D  $37^{\circ} 28'$ .

$57^{\circ} 9' - 2^{\circ} 22' = 54^{\circ} 47'$  moderated M D of the limit

$135298 + 0.45751 = 184239$ , 1 P L. of  $1^{\circ} 35'$

A D =  $37^{\circ} 26' + 1^{\circ} 35' = 38^{\circ} 3'$ .

The A D of the convergent is  $39^{\circ} 3'$ . Therefore, we have

**Rule XXXIV**—In Case (i) where D B has not to cross its first M H,

A D = M D of D B + mod M D of limit

In Case (ii) where D B has to cross its first M H,

A D = M D of D B + mod M D of limit

To facilitate calculations of primary zodiacal directions to bodies (i) a schedule of the S D's between the various permutations of bodies taken two at a time, noting whether each was obtained by rectification or not (see Schedule XIII), (ii) a schedule of the limits of all the aspects both of the decreasing and the increasing series, of every body (see Schedule XIV) and (iii) a schedule of the longitudes, semi arcs, meridional distances, right ascensions and oblique ascensions when on the horizon of the birth place, and the ternary proportional logarithms of the ratios of the S A's to the M D's of all the various zodiacal limits of every body (see Schedule V) may be preliminarily prepared. This last schedule is in fact an extensive speculum of the limits taken with no latitude. The reader will do well to calculate the A D's in a series of directions of the same body to all others, when he will realise that with the change in the position of the limit the nature of all arcs change, as shown in the working of the above examples.

**54 Directions to Zodiacal Parallel**—This is mathematically impossible. No amount of manipulation can influence the apparent diurnal rotation of the heavens to alter the annual motion in the declination of bodies.

**55 Directions to Zodiacal Rapt Parallel**—It is a rigid impossibility to direct a body to the zodiacal rapt parallel of another body, for the annual motions of the several bodies vary vastly and independently of each other.

**Problem 22**—Find the A.D.s of the direct primary zodiacal directions of M.C. to Saturn

The rectified Acl. D from M.C. to ♄ is  $66^{\circ} 41'$

(1) The first A.E. is the increasing ☊ and first limit is  $294^{\circ} 6'$

The R.A. of  $294^{\circ} 6'$  is  $296^{\circ} 0'$  and the R.A. of M.C. is  $270^{\circ} 57'$

The A.D. of M.C. ☊ ♄ (d rect) =  $296^{\circ} 0' - 270^{\circ} 52' = 25^{\circ} 8'$

(2) Again the next A.E. is ♈ and the limit is  $324^{\circ} 6'$

The R.A. of  $324^{\circ} 6'$  is  $326^{\circ} 25'$  and the R.A. of M.C. is  $270^{\circ} 52'$

The A.D. of M.C. ♈ ♄ (d rect) =  $326^{\circ} 25' - 270^{\circ} 52' = 55^{\circ} 33'$

Problem 23—Find the A.D.'s. of the converse primary zodiacal directions of the Ascendant to Jupiter.

The unrectified Cl D from the Ascendant to Jupiter is  $96^{\circ} 23'$

- (1) The first A.E. is the decreasing  $\square$ , and the first limit is  $355^{\circ} 40'$ .

The O.A.H. of the limit is  $358^{\circ} 10'$ , and the O.A.H. of the Ascendant is  $0^{\circ} 52'$

- $\therefore$  The A.D. of Asc.  $\square$   $\mathcal{A}$  (converse) =  $360^{\circ} 52' - 358^{\circ} 10' = 2^{\circ} 42'$

- (2) Again, the next A.E. is  $\ast$ , and the limit is  $325^{\circ} 40'$

The O.A.H. of the limit is  $344^{\circ} 40'$ , and the O.A.H. of the Ascendant is  $0^{\circ} 52'$

- $\therefore$  The A.D. of Asc.  $\ast$   $\mathcal{A}$  (converse) =  $360^{\circ} 52' - 344^{\circ} 40' = 16^{\circ} 12'$

- (3) Again, the next A.E. is  $\delta$ , and the limit is  $265^{\circ} 40'$

The O.A.H. of the limit is  $298^{\circ} 0'$ , and the O.A.H. of the Ascendant is  $0^{\circ} 52'$ .

- $\therefore$  The A.D. of Asc.  $\delta$   $\mathcal{A}$  (converse) =  $360^{\circ} 52' - 298^{\circ} 0' = 62^{\circ} 52'$ .

Problem 24—Find the A.D.'s of the direct primary zodiacal directions of Mars to Moon.

The unrectified Act D from Mars to Moon is  $55^{\circ} 28'$

- (1) The first A.E. is the decreasing  $\delta$ , and the limit is  $181^{\circ} 3'$

- $\therefore$  The SNA of the limit is  $90^{\circ} 31'$ , and its L.M.D. is  $90^{\circ} 6'$

The birth SNA of D.B. taken with lat is  $62^{\circ} 29'$ , and its L.M.D. is  $37^{\circ} 28'$

- $\therefore 90^{\circ} 31' : 90^{\circ} 6' :: 62^{\circ} 29' : \text{moderated MD of SP}$

$000201 + 045951 = 046152$ , T.P.L. of  $62^{\circ} 13'$ .

- $\therefore$  The A.D. of  $\delta$   $\mathcal{D}$  (direct) =  $62^{\circ} 13' - 37^{\circ} 28' = 24^{\circ} 44'$

- (2) The D.B.'s M.D. being less, further directions will be late

Schedule XII—S.A.'s. and T.P.L.'s of Bodies taken with and without latitude.

Bodies.	S.A. with lat.	T.P.L.	S.A. with no lat.	T.P.L.
$\psi$	$86^{\circ} \text{ N } 41$	$0^{\circ} 31734$	$84^{\circ} \text{ N } 57$	$0^{\circ} 32611$
$\gamma$	$72^{\circ} \text{ N } 50$	$0^{\circ} 39294$	$70^{\circ} \text{ N } 50$	$0^{\circ} 40503$
$\gamma$	$71^{\circ} \text{ N } 36$	$0^{\circ} 40036$	$67^{\circ} \text{ N } 2$	$0^{\circ} 42898$
$\circ$	$59^{\circ} \text{ N } 9$	$0^{\circ} 48332$	$59^{\circ} \text{ N } 9$	$0^{\circ} 48332$
$\text{H}$	$56^{\circ} \text{ N } 48$	$0^{\circ} 50092$	$57^{\circ} \text{ N } 9$	$0^{\circ} 49826$
$\delta$	$62^{\circ} \text{ N } 29$	$0^{\circ} 45951$	$64^{\circ} \text{ N } 41$	$0^{\circ} 44448$
$\text{D}$	$93^{\circ} \text{ N } 20$	$0^{\circ} 28524$	$90^{\circ} \text{ N } 31$	$0^{\circ} 29854$
$\ast$	$81^{\circ} \text{ D } 22$	$0^{\circ} 34483$	$78^{\circ} \text{ D } 7$	$0^{\circ} 36253$
$\mathcal{A}$	$58^{\circ} \text{ D } 4$	$0^{\circ} 49135$	$57^{\circ} \text{ D } 17$	$0^{\circ} 49724$



Schedule XIV—Limits

S P s in their order	In Direct directions to Increasing aspects and in Converse directions to Decreasing aspects									
	♈	♉	♊	♋	♌	♍	♎	♏	♐	♑
1	10° 10	70° 10	100° 10	130° 10	190° 10'	250° 10	280° 10	310° 10'	10° 10	
2	39 39	99 39	129 39	159 39	219 39	279 39	309 39	339 39	39 39	
3	48 29	108 29	138 29	168 29	228 29	288 29	318 29	348 29	48 29	
4	72 26	132 26	162 26	192 26	252 26	312 26	342 26	12 26	72 26	
5	88 37	148 37	178 37	208 37	268 37	328 37	358 37	28 37	88 37	
6	125 35	185 35	215 35	245 35	305 35	5 35	35 35	65 35	125 35	
7	181 3	241 3	271 3	301 3	1 3	61 3	91 3	121 3	181 3	
8	204 6	264 6	294 6	324 6	24 6	84 6	114 6	144 6	204 6	
9	265 +0	325 +0	355 +0	25 +0	85 40	145 40	175 40	205 40	265 40	

In Direct directions to Decreasing aspects  
and in Converse directions to Increasing aspects

Schedule XV—Speculum of zodiacal Limits taken with no latitude

Limit	RA	OAH	SA	MD	TPL of SA MD	Limit	RA	OAH	SA	MD
1° 3	0° 55'	0° 27'	90 D 31	90 U 6	0 00201	181° 3	180° 58'	181° 29'	90 N 31	90 L 6
2 3	1 53	0 52	91 D 1	91 U 1	0 00000	182 3	181 53	182 54	91 N 1	91 L 1
5 35	5 7	2 21	87 N 14	85 L 45	0 00745	185 35	185 7	187 53	87 D 14	85 U 45
10 10	9 21	4 18	84 N 57	81 L 31	0 01792	190 10	189 21	194 24	84 D 57	81 U 31
12 26	11 26	5 16	83 N 50	79 L 26	0 02341	192 26	191 26	197 36	83 D 50	79 U 26
24 6	22 19	10 26	78 N 7	68 L 33	0 05674	204 6	202 19	214 12	78 D 7	68 U 33
25 40	23 47	11 8	77 N 21	67 L 5	0 06185	205 40	203 47	216 26	77 D 21	67 U 5
28 37	26 35	12 33	75 N 58	64 L 17	0 07252	208 37	206 35	220 37	75 D 58	64 U 17
35 35	33 17	15 57	72 N 40	57 L 35	0 10104	215 35	213 17	230 37	72 D 40	57 U 35
39 39	37 15	18 5	70 N 50	53 L 37	0 12094	219 39	217 15	236 25	70 D 50	53 U 37
48 29	46 1	23 3	67 N 2	44 L 51	0 17453	228 29	226 1	248 59	67 D 2	44 U 51
61 3	58 55	31 14	62 N 19	31 L 57	0 29013	241 3	238 55	266 36	62 D 19	31 U 57
65 35	63 40	34 35	60 N 55	27 L 12	0 35016	245 35	243 40	272 45	60 D 55	27 U 12
70 10	68 32	38 15	59 N 43	22 L 20	0 42714	250 10	248 32	278 49	59 D 43	22 U 20
72 26	70 58	40 7	59 N 9	19 L 54	0 47310	252 26	250 58	281 49	59 D 9	19 U 54
84 6	83 34	50 58	57 N 24	7 L 18	0 89559	264 6	263 34	296 10	57 D 24	7 U 18
85 40	85 17	52 34	57 N 17	5 L 35	1 01114	265 40	265 17	298 0	57 D 17	5 U 35
88 37	88 30	55 39	57 N 9	2 L 22	1 38288	268 37	268 30	301 21	57 D 9	2 U 22
90 47	90 52	58 1	57 N 9	0 L 0	Infinite	270 47	270 52	303 43	57 D 9	0 U 0
91 3	91 9	58 18	57 N 9	0 L 17	2 30471	271 3	271 9	304 0	57 D 9	0 U 17
99 39	100 30	68 15	57 N 45	9 L 38	0 77778	279 39	280 30	312 45	57 D 45	9 U 38
100 10	101 4	68 54	57 N 50	10 L 12	0 75358	280 10	281 4	313 14	57 D 50	10 U 12
108 29	110 1	79 24	59 N 23	19 L 9	0 49149	288 29	290 1	320 38	59 D 23	19 U 9
114 6	116 0	86 50	60 N 50	25 L 8	0 38389	294 6	296 0	325 10	60 D 50	25 U 8
121 3	123 16	95 19	63 N 3	32 L 24	0 28914	301 3	303 16	330 13	63 D 3	32 U 24
125 35	127 57	102 38	64 N 41	37 L 5	0 24161	305 35	307 57	333 16	64 D 41	37 U 5
129 39	132 6	108 22	66 N 16	41 L 14	0 20604	309 39	312 6	335 50	66 D 16	41 U 14
130 10	132 37	109 6	66 N 29	41 L 45	0 20206	310 10	312 37	336 8	66 D 29	41 U 45
132 26	134 54	112 19	67 N 25	44 L 2	0 17849	312 26	314 54	337 29	67 D 25	44 U 2
138 29	140 55	120 55	70 N 0	50 L 3	0 14570	318 29	320 55	340 55	70 D 0	50 U 3
144 6	146 25	128 57	72 N 32	55 L 33	0 11586	324 6	326 25	343 53	72 D 32	55 U 33
145 40	147 56	131 12	73 N 16	57 L 4	0 10852	325 40	327 56	344 40	73 D 16	57 U 4
148 37	150 46	135 25	74 N 39	59 L 54	0 09561	328 37	330 46	346 7	74 D 39	59 U 54
152 39	161 12	151 9	79 N 57	70 L 20	0 03566	339 39	341 12	351 15	79 D 57	70 U 20
162 26	163 48	155 5	81 N 17	72 L 56	0 04708	342 26	343 48	352 31	81 D 17	72 U 56
168 29	169 25	163 42	84 N 17	78 L 33	0 03060	348 29	349 25	355 8	84 D 17	78 U 33
175 40	176 1	173 52	87 N 51	85 L 9	0 01356	355 40	356 1	358 10	87 D 51	85 U 9
178 37	178 44	178 3	89 N 19	87 L 52	0 00711	358 37	358 44	359 25	89 D 19	87 U 52

Problem 25—Find the A.D.'s of the direct primary zodiacal directions of Mercury to Neptune.

The rectified Acl, D from Mercury to Neptune is  $38^{\circ} 19'$ .

- (1) The first A.E. is the increasing  $\ast$ , and the first limit is  $70^{\circ} 10'$ .  
 The SNA of the limit is  $59^{\circ} 43'$ , and its LMD is  $22^{\circ} 20'$ .  
 The SNA of Mercury (DB) is  $71^{\circ} 36'$ , and its LMD  $43^{\circ} 55'$ ,  
 $59^{\circ} 43' : 22^{\circ} 20' :: 71^{\circ} 36' : \text{moderated MD of the limit}$   
 $042714 + 040036 = 082750$ , TPL. of  $26^{\circ} 47'$ .

Case 1: The A.D. of  $\ast \ast \Psi$  (direct) =  $43^{\circ} 55' - 26^{\circ} 47' = 17^{\circ} 8'$ .

Here DB's MD is greater

- (2) Again, the next A.E. is the increasing  $\square$ , and the first limit is  $100^{\circ} 10'$ .  
 The SNA of the limit is  $57^{\circ} 50'$ , and its LMD  $10^{\circ} 12'$ .  
 The SNA of Mercury (DB) is  $71^{\circ} 36'$ , and its LMD  $43^{\circ} 55'$ .  
 $57^{\circ} 50' : 10^{\circ} 12' :: 71^{\circ} 36' : \text{moderated MD of the limit.}$   
 $075358 + 040036 = 115394$ , TPL. of  $12^{\circ} 38'$

Case 2: The A.D. of  $\ast \square \Psi$  (direct) =  $43^{\circ} 55' + 12^{\circ} 38' = 56^{\circ} 33'$ .

The rest will be late

Problem 26—Find the A.D.'s of the converse primary zodiacal directions of Jupiter to Saturn.

The unrectified Cl, D from Jupiter to Saturn is  $61^{\circ} 34'$

- (1) The first A.E. is the decreasing  $\ast$ , and the first limit is  $264^{\circ} 6'$ .  
 The SDA of the limit is  $57^{\circ} 24'$ , and its UMD  $7^{\circ} 18'$ .  
 The SDA of Jupiter (DB) is  $58^{\circ} 4'$ , and its UMD  $5^{\circ} 35'$   
 $57^{\circ} 24' : 7^{\circ} 18' :: 58^{\circ} 4' : \text{moderated MD of the limit}$   
 $089559 + 049135 = 138694$ , TPL. of  $7^{\circ} 23'$

Case 1: The A.D. of  $\ast \ast \frac{1}{2}$  (converse) =  $7^{\circ} 23' - 5^{\circ} 35' = 1^{\circ} 48'$ .

Here DB's MD is less

- (2) Again, the next A.E. is the decreasing  $\delta$ , and the first limit is  $204^{\circ} 6'$ .  
 The SDA of the limit is  $78^{\circ} 7'$ , and its UMD  $63^{\circ} 33'$ .  
 The SDA of Jupiter (DB) is  $58^{\circ} 4'$ , and its UMD  $5^{\circ} 35'$   
 $78^{\circ} 7' : 63^{\circ} 33' :: 58^{\circ} 4' : \text{moderated MD of the limit}$   
 $005674 + 049135 = 054809$ , TPL. of  $50^{\circ} 57'$

Case 1: The A.D. of  $\ast \delta \frac{1}{2}$  (converse) =  $50^{\circ} 57' - 5^{\circ} 35' = 45^{\circ} 22'$

Here DB's MD is less

The rest will be late

Problem 27—Find the A.D. in the converse primary zodiacal directions of Saturn to Mars.

The unrectified Cl, D from Saturn to Mars is  $78^{\circ} 31'$

- (1) The first A.E. is the decreasing  $\ast$ , and the first limit is  $185^{\circ} 35'$ .  
 The SDA of the limit is  $87^{\circ} 14'$ , and its UMD  $85^{\circ} 45'$ .  
 The SDA of Saturn (DB) is  $81^{\circ} 22'$ , and its UMD  $67^{\circ} 36'$   
 $87^{\circ} 14' : 85^{\circ} 45' :: 81^{\circ} 22' : \text{moderated MD of the limit}$   
 $000745 + 034483 = 035228$ , TPL. of  $79^{\circ} 59'$

Case 1: The A.D. of  $\ast \ast \delta$  (converse) =  $79^{\circ} 59' - 67^{\circ} 36' = 12^{\circ} 23'$

Here DB's MD is less

(2) Again, the next A.E. is the decreasing  $\delta$ , and the first limit is  $125^{\circ} 35'$ .

The S.N.A. of the limit is  $64^{\circ} 41'$ , and its L.M.D.  $37^{\circ} 5'$

The S.N.A. of Saturn (DB) is  $98^{\circ} 38'$ , and its L.M.D.  $112^{\circ} 24'$

$64^{\circ} 41' : 37^{\circ} 5' :: 98^{\circ} 38' : \text{moderated MD of the limit}$

$0.24161 + 0.26125 = 0.50286$ , T.P.L. of  $56^{\circ} 33'$

Case 1: The A.D. of  $\frac{1}{2} \delta \delta$  (converse)  $= 112^{\circ} 24' - 56^{\circ} 33' = 55^{\circ} 51'$ .

Here DB's MD is greater

Note that in this problem the S.A. of DB changes from diurnal to nocturnal

**Problem 28**—Find the A.D.'s of the converse primary zodiacal directions of Mars to Uranus.

The unrectified Cl.D. from Mars to Uranus is  $36^{\circ} 58'$

The first A.E. is the decreasing  $\delta$ , and the first limit is  $88^{\circ} 37'$ .

The S.N.A. of the limit is  $57^{\circ} 9'$ , and its L.M.D.  $2^{\circ} 22'$

The S.N.A. of Mars (DB) is  $62^{\circ} 29'$ , and its L.M.D.  $37^{\circ} 28'$

$57^{\circ} 9' : 2^{\circ} 22' :: 62^{\circ} 29' : \text{moderated MD of the limit}$

$1.38288 + 0.45951 = 1.84239$ , T.P.L. of  $2^{\circ} 35'$

Case 11: The A.D. of  $\delta \delta \frac{1}{2}$  (converse)  $= 37^{\circ} 28' + 2^{\circ} 35' = 40^{\circ} 3'$

The rest will be late

**Exercise 42**—Prepare the schedule of the Semi arcs of bodies taken with latitude and without latitude, giving their T.P.L.'s as shown in Schedule XII, for the standard nativity

**Exercise 43**—Prepare the schedule of Shorter Distances, indicating whether each has been obtained by rectification or not, as shown in Schedule XIII, between every pair of bodies in the standard nativity

**Exercise 44**—Prepare the schedule of the Limits of the different major aspects, of both the decreasing and increasing series, of every body in the standard nativity, similar to Schedule XIV

**Exercise 45**—Prepare the schedule or speculum of the Longitudes, R.A.s, O.A.H.'s S.A.'s and M.D.'s of every limit taken with no latitude, and the T.P.L.'s of the ratios S.A.'s' M.D.'s of all the limits taken with no latitude for the standard nativity, as shown in Schedule XV

**Exercise 46**—Calculate the A.D.s of all the primary zodiacal direct directions of MC to the various bodies in the standard nativity

**Exercise 47**—Calculate the A.D.'s of all the primary zodiacal converse directions of the Ascendant to the various bodies in the standard nativity

**Exercise 48**—Calculate the A.D.s of all the primary zodiacal direct directions of Mercury to the various bodies in the standard nativity

**Exercise 49**—Calculate the A.D.s of all the primary zodiacal converse directions of Saturn to the various bodies in the standard nativity

**56. Are Primary Zodiacal Directions Rational?**—The first feature of primary zodiacal directions that provokes thought, is that the angles are made to act as D.B.'s. The angles are fixed points through which the various zodiacal points move clockwise caused by the apparent diurnal rotation of the heavens, and anti-clockwise caused by the annual motions of bodies. How can fixed points be possibly directed? Their direct directions are anti-clockwise, and their con-



verse ones clockwise to be in consonance with the anti clockwise annual motions of bodies, but in reality, as it is the bodies that move anti clockwise, the directions of angles are taken contrariwise, that is, in their direct directions they are made to move anti clockwise, and in their converse ones clockwise, which is opposed to what is admitted to be the case in the zodiacal directions. This change seems to have been adopted to get over the difficulty of having to determine the longitudes, the R A s, and the oblique ascensions of the limits measured from the angles, when the angles are treated as S P 's which they really are.

The next point is that the limits are taken with no latitude, that is, they are treated as mere ecliptic points. For, to determine the celestial latitude of limits we have to know its declination and right ascension which we know not. Hence declinations of limits are taken to be identical with those of ecliptic points having the same zodiacal longitude that is, limits are treated as if they are mere ecliptic points, and their right ascensions, oblique ascensions, semi arcs, and meridional distances are accordingly calculated. On the other hand, the limits can very approximately be assigned their birth latitudes, as they do not appreciably change during the few sidereal hours after birth which is the ultimate basis of all primary directions. Should this right procedure of taking limits with their birth latitudes be adopted, then the arcs of directions would be exactly the same as those of the 'opposite' primary mundane directions, thus revealing the real identity between the primary zodiacal and the primary mundane directions.

The next point to be thought over is the practice of taking directed bodies with their birth latitudes. Such a procedure is opposed to the accepted fundamental principles of directions, namely, taking all arcs similar—all diurnal or all nocturnal and all from upper M H or all from lower M H. That the practice in vogue of taking D B s with birth latitude is palpably objectionable, is revealed by the fact that a D B cannot very often be directed to the aspect of a body very close to it, and also by attempts to direct a body to the conjunction of its own position in which latter cases the A D should correctly speaking, be  $0^{\circ} 0'$ . For example, in the standard nativity in the direct direction of Venus to the sextile of Moon the U M D of D B at birth is  $1^{\circ} 5'$ , and the moderated U M D of the limit is  $0^{\circ} 37'$ . Therefore the limit has to be directed clockwise to effect a direct direction which is opposed to the accepted principle of having to move D B s anti clockwise in direct ones and clockwise in converse ones. Instances can be multiplied. Also, if the reader attempts to calculate the A D s in the direct and converse directions of a body to its own birth position almost in every case the A D obtained would point to the motion of D B contrariwise to the accepted principles. If on the other hand, the D B s at birth are also taken with no latitude then the A D s obtained would be  $0^{\circ} 0'$ . In con

clusion the A D s in direct and converse primary zodiacal directions would be found to be practically the same as those obtained in the opposite primary mundane directions

In fact the primary zodiacal directions seem to be a medley between the primary mundane directions and the secondary directions to be discussed presently. They seem to have been invented and adopted just to overcome the difficulty of having to calculate primary mundane directions in which mundane positions have to be expressed in houses and cuspal distances. Unanswerable objections to the adoption of primary zodiacal directions could be raised when an attempt is made to calculate primary zodiacal parallels. No amount of mathematical manipulation could possibly change the declination of a body due to the diurnal rotation. Again, the primary zodiacal right parallel would be a rigid impossibility, for bodies in their annual motion have too widely varying rates of motion to render it possible for any two of them to be moved, maintaining the zodiacal distance between them constant. For these valid reasons we have to give up the practice of adopting primary zodiacal directions. Some authors have, in vain, attempted to cure these defects by adopting new methods.

To enable the reader to readily appreciate my contention (1) that primary zodiacal directions are nothing but sad apologies for primary mundane directions in which the limits of bodies are taken with no latitude, (2) that in calculating primary zodiacal directions the D B s also should be taken with no latitude, and (3) that primary zodiacal directions as now calculated taking limits with no latitude and D B s with latitude, are anything but a medley of the above two rational principles I append below the A D s of some primary mundane directions and their analogous primary zodiacal directions. The directions of bodies are calculated firstly, taking limits with no latitude and D B s with latitude secondly, taking both limits and D B's with no latitude and thirdly, taking both limits and D B s with latitude—all worked out with reference to the standard nativity. It may be pointed out that in the case of the Angles the direct primary mundane directions are analogous to the direct primary zodiacal directions and the converse mundane ones to the converse zodiacal ones. But, that in the case of Bodies, the direct primary mundane direction are analogous to the converse primary zodiacal directions and vice versa. In this exemplification I have illustrated only directions to conjunction and opposition as there is no complication in their cases.

Mundane Direct	Zodiacal Direct	Mundane Direct	Zodiacal Direct
O $\angle$ MC = 48° 17	MC $\angle$ O = 48° 6	$\gamma$ $\angle$ Asc = 4° 24	Asc $\angle$ $\gamma$ = 4° 13
D $\angle$ MC = 63 18	MC $\angle$ D = 63 17	HI $\angle$ Asc = 6 23	Asc. $\angle$ HI = 6 6
b $\angle$ MC = 68 59	MC $\angle$ b = 69 7	$\nu$ * Asc = 42 15	Asc * $\nu$ = 42 19
f $\angle$ MC = 70 11	MC $\angle$ f = 70 1		

	Primary Mundane direc- tion	Primary Zodiacal direction, limit with no latitude and DB with latitude (as usual)	Primary Zodiacal direction limit and DB with no latitude	Primary Zodiacal direction both limit and DB with latitude
♈ & ♈	conv 1° 59 7	1° 43 0 dir	1° 53 1 dir	1° 59 7 dir
♈ & ♈	conv 3 0 4	2 43 6 dir	3 18 4 dir	3 0 4 dir
♈ & ♈	dir 5 17 5	5 33 0 conv	5 40 2 conv	5 15 7 conv
♈ & ♈	conv 5 15 5	5 21 2 dir	5 40 0 dir	5 13 9 dir
♈ & ♈	dir 7 0 2	7 15 9 conv	6 39 1 conv	6 58 4 conv
♈ & ♈	dir 12 11 8	12 54 4 conv	11 54 8 conv	12 11 8 conv
♈ & ♈	conv 15 19 0	15 3 1 dir	15 3 0 dir	15 20 7 dir
♈ & ♈	dir 18 56 1	18 48 5 conv	18 16 2 conv	18 56 0 conv
♈ & ♈	conv 19 54 8	19 44 4 dir	19 36 0 dir	19 54 6 dir
♈ & ♈	dir 19 59 1	19 51 5 conv	19 42 0 conv	19 59 0 conv
♈ & ♈	conv 20 35 9	20 40 3 dir	20 43 2 dir	20 35 9 dir
♈ & ♈	conv 21 55 1	21 38 1 dir	21 30 0 dir	21 55 1 dir
♈ & ♈	dir 21 59 1	21 51 6 conv	21 35 9 conv	21 59 1 conv
♈ & ♈	dir 22 13 1	22 26 3 conv	21 42 4 conv	22 13 2 conv
♈ & ♈	dir 25 18 5	25 34 3 conv	26 20 1 conv	25 16 6 conv
♈ & ♈	dir 27 18 7	27 34 6 conv	27 19 5 conv	27 16 9 conv
♈ & ♈	dir 39 36 9	39 36 6 conv	39 9 1 conv	39 36 7 conv
♈ & ♈	dir 40 44 3	40 44 1 conv	40 36 0 conv	40 44 3 conv
♈ & ♈	dir 42 45 1	42 44 9 conv	42 31 4 conv	42 45 1 conv
♈ & ♈	conv 49 2 6	49 2 7 dir	49 36 5 dir	49 2 5 dir
♈ & ♈	conv 61 50 3	61 50 3 dir	62 17 4 dir	61 50 1 dir
♈ & ♈	conv 64 56 7	64 40 3 dir	65 7 7 dir	64 58 5 dir
♈ & ♈	conv 70 25 8	70 33 6 dir	70 55 5 dir	70 26 0 dir
♈ & ♈	dir 71 16 4	71 32 0 conv	70 31 0 conv	71 16 8 conv
♈ & ♈	dir 73 7 8	73 17 4 conv	72 15 9 conv	73 8 0 conv

The disparity in the arcs of directions in other cases not mentioned in the above Table, is due to the dissimilarity in the various arcs taken

**Contention III**—Primary Zodiacal directions are Irrational

Let us find the daily motion of Moon from Greenwich mean mid night of June 23, 1865 to the Greenwich mean midnight of June 24, 1865

R A of Moon at G M N on June 23, 1865 is 11 h 57 m 30.89s

" " " " 34, " 12 h 42 m 33.90s

The daily motion of Moon in R A at birth was 0 h 45 m 3.01 s

0 h 45 m 3.01 s of R A in time is  $11^{\circ} 15' 45''$  of arc

∴ 1361th part of the daily motion is  $0^{\circ} 1' 52''$  of arc

Therefore, the correction for annual motion to be applied in all directions of the Moon is  $1' 52''$  for every degree in the arcs of directions. And the correction for Moon is always positive. Therefore, the positive corrections are (i)  $2^{\circ} 47'$ , (ii)  $1^{\circ} 49'$ , (iii)  $1^{\circ} 50'$ , (iv)  $0^{\circ} 39'$  and (v)  $1^{\circ} 0'$ .

It may be observed that this correction should always be applied at least in the cases where the daily motion in R A of the directed body exceeds 20 minutes of arc, as the time measured to in such a case would be about one month. But the important directions being those of bodies moving slowly such as  $\psi$ ,  $\iota$ ,  $\mu$  and  $\varphi$ , this correction may be ignored in regard to them.

**59 The Measure of Time**—In primary directions mundane and zodiacal, every degree in the A D measures to one year. One ordinary year consists of 365 days, and one leap year of 366 days. So one minute of arc measures to  $365-60$ , i.e. six and one twelfth of a day in an ordinary year and to  $366-60$  i.e. six and one tenth of a day in a leap year. Accordingly every minute is made to measure six and one twelfth of a day from the birth date during the ordinary year, and six and one tenth of a day from the birth date in a leap year. The year is not quite the calendar year, but the calendar year from birth date to birth date. The leap year is not quite the calendar leap year, but the calendar year from the birth date in which the month of February with 29 days occurs. The exact dates to which every minute of arc from one to sixty, in both an ordinary and a leap year, measures may be arranged in tabular form to enable one to readily convert minutes in any A D into calendar dates. The year to which an A D measures is obtained by adding the number of degrees in the A D to the year of birth. For example, the A D  $54^{\circ} 16'$  in George V's nativity would measure to a date in the year, from 1884 m June 23 (1865+54) 1919 to 1884 m June 23 1920, which is to be taken as a leap year since February 1920 falling within the year consists of 29 days. And 16 minutes of arc in the A D measures in a leap year to  $16 \times 6.1$ , i.e. 98 days which counted from June 23 of 1919 falls on the 9th September 1919, so the arc of direction  $54^{\circ} 16'$ , in George V's nativity, measures to the 9th September 1919. But the arc of direction  $55^{\circ} 16'$  would measure to a date in the year from 1884 m 23 June 1920 to 1884 m June 1921 which is to be taken as an ordinary year, since February 1921 falling within the year con

sists of 28 days And 16 minutes of arc in the A D measures in an ordinary year to  $16 \times 6'083$ , i.e., 97 days which counted from June 23 of 1920 falls on the 8th September 1920, and so the arc of direction,  $55^{\circ} 16'$ , in George V's nativity, measures to the 8th September 1920 So a table of the dates in both an ordinary and a leap year to which every minute in the arc of direction, from one to sixty, would measure, should be prepared beforehand to facilitate the conversion of arcs into time to which they measure (see Schedule XVI) The scheduled dates should clinch the time of the native's life incidents accurately, subject to a negative or positive error of one day, due to decimal approximation

Schedule XVI—Dates measured to by every minute of arc in the A D's

Arc	In Ordinary year		In Leap year		Arc	In Ordinary year		In Leap year	
1'	June	9	June	9	31'	Dec	9	Dec	9
2	"	15	"	15	32	"	15	"	15
3	"	21	"	21	33	"	21	"	21
4	"	27	"	27	34	"	27	"	27
5	July	3	July	4	35	Jan	2	Jan	3
6	"	10	"	10	36	"	8	"	9
7	"	16	"	16	37	"	14	"	15
8	"	22	"	22	38	"	20	"	21
9	"	28	"	28	39	"	26	"	27
10	Aug	3	Aug	3	40	Feb	1	Feb	2
11	"	9	"	9	41	"	7	"	8
12	"	15	"	15	42	"	14	"	14
13	"	21	"	21	43	"	20	"	20
14	"	27	"	27	44	"	26	"	26
15	Sep	2	Sep	3	45	Mar	4	Mar	4
16	"	8	"	9	46	"	10	"	10
17	"	14	"	15	47	"	16	"	16
18	"	21	"	21	48	"	22	"	22
19	"	27	"	27	49	"	28	"	28
20	Oct	3	Oct	3	50	Apr	3	Apr.	3
21	"	9	"	9	51	"	9	"	9
22	"	15	"	15	52	"	15	"	15
23	"	21	"	21	53	"	21	"	21
24	"	27	"	27	54	"	28	"	27
25	Nov	2	Nov	3	55	May	4	May	4
26	"	8	"	9	56	"	10	"	10
27	"	14	"	15	57	"	16	"	16
28	"	20	"	21	58	"	22	"	22
29	"	26	"	27	59	"	28	"	28
30	Dec	3	Dec	3	60	June	3	June	3

Finally, all the A D's measuring to a year or to consecutive years of life may be arranged chronologically for comparative study

tions, they are held to bear fruit in later years measured to by the arcs of directions. As secondary directions are slowly formed and dissolved, an error of even half an hour in the birth time would produce in the time measured to only a difference of about a week. Consequently, the moment of birth need not be accurately known, as in the case of the primary directions. Secondary directions are so called, because they are completed second in point of time after birth, as compared with the primary directions. In secondary directions, the aspects as well as the arcs of directions are all measured upon the ecliptic, and are not to all referred to the equator. Therefore, all secondary directions are purely zodiacal, their being no secondary mundane directions. The course of direction in secondary directions is always anti-clockwise. Very rightly, converse secondary directions are not recognised.

**61 The Progressed Date corresponding to an Ordinal year of Life—**Cardinal numbers are such as 1, 2, 3, 4, 5, 32, and 87, and ordinal numbers are such as 1st, 2nd, 3rd., 4th, 5th, 32nd, and 87th. Since one day measures to one year of life in secondary directions, so to find the directions that will operate during a particular ordinal year in an individual's life, we should cast the horoscopes for the moment of birth on the two ordinal number of days corresponding to the required ordinal year of life and its succeeding one. Ordinal numbers of time relate to current periods, but cardinal numbers of time to expired periods. In secondary directions we are concerned with current periods, so we should adopt the ordinals, and adhere to it to have one system of reckoning. For example, to find the secondary directions which are held to have borne fruit in George V's 35th year, we should find the two ordinal days from birth corresponding to the 35th and the 36th year of his life. They are the 35th and the 36th day counted from the birth day, taking it as the first. George V was born at 1 18 a m on June 3, 1865, so the 35th and the 36th day from birth are July 7 and 8, 1865. So we should cast horoscopes for 1 18 a m, G M T, (see Art 62) on July 7 and 8, 1865. The secondary directions found to have been completed between the two dates are held to have operated in the 35th year of his life, that is from June 3, 1909 to June 3, 1910. Again, if we desire to find the secondary directions operating during a period of consecutive years say, from the 27th to the 55th year in his life, i.e., from June 3, 1891 to June 3, 1919, we should cast horoscopes for 1 18 a m G M T (see Art 62) on every day from June 29 to July 27, 1865. The date of an ordinal number of day from birth for whose moment horoscope is cast is termed the **progressed date**, and the horoscope cast the **progressed horoscope**. The ordinal year of life during which directions operate may be termed the **progressed year**. Therefore, we have

**Rule XXXV—**Date of Birth + the Ordinal number of Days - 1 = the Progressed Date

When the result, obtained by applying the rule, exceeds the maximum number of days in the calendar month of birth, deduct from it the maximum number of calendar days and take the remainder as the date in the succeeding month, and when the result exceeds the sum of the maximum number of calendar days in the month of birth and also its succeeding one, deduct from it the sum of the maximum numbers of calendar days in the two months, and take the balance as the date in the third month. For example, George V having been born on June 3, 1865, the progressed date for the 70th day from his birth is  $3 + 70 - 1$  or the 72nd day from June 1, 1865. Since 72 exceeds 61, the sum of the maximum numbers of calendar days in June and July, by 11, the progressed date is August 11, 1865. Also we have

**Rule XXXVI**—The Calendar year of Birth + the Ordinal number of year - 1 = the Progressed year

For example, George V having been born on June 3, 1865, the 70th year from his birth is  $1865 + 70 - 1$  or 1934, that is, from June 3, 1934 to June 3, 1935. A year is made to commence always from the birth date. Conversely, the ordinal number of the year of life of any calendar year beginning from the date of birth is found with the aid of

**Rule XXXVII**—The given Calendar year + 1 - the Calendar year of Birth = the Ordinal number of year from Birth

For example, the calendar year 1934 beginning from the birth date, June 3 (of 1934) is  $1934 + 1 - 1865$  or the 70th year of life. As it has been suggested at the very outset, that all calculations will be illustrated by taking George V's horoscope, let us jot down a few momentous epochs in his life, to calculate all the secondary directions that were operating during the momentous epochs.

1. He was married to Queen Mary (then Princess) on July 6, 1893
2. He became the Prince of Wales at the end of 1901.
3. He became King George V on May 6, 1910
4. He ascended the throne on October 22, 1910

The four events mentioned above transpired in his 29th, 37th, 45th and 46th years. So let us calculate all the secondary directions which operated during the four years. For this purpose, we require also the progressed moments in the succeeding years. So we shall calculate for the 29th, 30th, 37th, 38th, 45th, 46th and 47th days from birth

**Problem 30**—Find the Progressed Dates and the Progressed Years in George V's nativity relating to his 29th, 37th, 45th and 46th years of life.

29th day is from 1 18 a.m on July 1, 1865	29th year is from 1 18 a.m, June 3, 1893
30th " " " 2, "	30th " " " 1894
37th " " " 9, "	37th " " " 1901
38th " " " 10, "	38th " " " 1902
45th " " " 17, "	45th " " " 1909
46th " " " 18, "	46th " " " 1910
47th " " " 19, "	47th " " " 1911

**62 Progressed Moment of Birth**—The moment for which progressed horoscopes are cast on every day after birth may be termed the **progressed moment**. It is customary to take the mean time of birth on every succeeding day after birth and to cast horoscopes. But mean day is only a conventional affair, whereas apparent day (see *Mathematical Astrology*, Art 20) is nature's or Sun's own day. But all ephemerides give the positions and the sidereal time for mean time only. So in casting birth horoscopes we take the Greenwich mean time of birth for finding the positions of bodies, and the local mean time of birth for determining the longitudes of the cusps. And in casting progressed horoscopes for every succeeding day after birth, we should first convert the local mean time of birth into apparent time by applying to it the equation of time as applicable to mean time on the date (see *Mathematical Astrology*, Article 25). Next, we should convert again the apparent time of birth into its equivalent mean time on every progressed date by applying to it the equation of time as applicable to apparent time, on the progressed date. The equation of time at a moment is determined according to any of the methods described in "*Hindu Astrological Calculations*," Article 11. It may also be found from Table I which gives the longitudes of the Sun, and the precise equation of time, as applied to apparent time, for every date in 1927. The equations of time for the dates in other years are the same varying with the longitudes of the Sun. Find it and that for an intermediate moment by Rule of Three. When equation is applied to apparent time, we get the mean time of the progressed moment of birth. Lastly, the local mean time of the progressed moment of birth on every progressed date should be converted into its equivalent Greenwich mean time of birth by applying the correction for longitude expressed in time (see *Mathematical Astrology*, Article 37). The equation of time as applied to mean time, required to convert it into apparent time, may be found from Table I by taking the figures with the opposite sign. Thus we obtain a series of local and Greenwich mean times varying more or less from each other.

**Problem 31**—Find the Progressed Moments of birth in George V's nativity on the progressed dates of July 1, 2, 9, 10, 17, 18, and 18 of 1865, given that at birth G.M.T. was 1 18 a.m., June 2/3, 1865, that the longitude of the Sun was  $72^{\circ} 26'$ , and that the longitude in time of the birth place was 37 sec W.



The G.M.T. of birth was 1-18 a.m.

The longitude in time of the birth place is 37 sec. west.

The L.M.T. of birth was 1-17-23 a.m.

The longitude of the Sun was  $72^{\circ} 26'$ .

∴ The Equation of Time, as applicable to mean time, on the date, was +2 m. 13 s.

∴ The apparent time of birth was 1-17 23+0-2-13, i.e., 1 h 19 m 36 s. or 1-20 a.m.

We should now find the local mean times corresponding to 1-20 a.m. local apparent time on every required progressed date, and then find again the equivalent Greenwich mean time on every such date.

Prog. Date.	The Sun's Long.	A T. of Birth.	Eq. of Time as applied to A T.	L.M.T. of <sup>*</sup> Prog. moment.	G.M.T. of <sup>*</sup> Prog. moment.
July 1	99	1-20 a.m.	+ 3 min	1-23 a.m.	1-23 a.m.
" 2	100	"	+ 4 min.	1 24 a.m.	1-24 a.m.
" 9	107	"	+ 5 min	1-25 a.m.	1-25 a.m.
" 10	108	"	"	"	"
" 17	114	"	+ 6 min.	1-26 a.m.	1 26 a.m.
" 18	115	"	"	"	"
" 19	116	"	"	"	"

The local mean time of birth was 1-18 a.m., and so the difference between it and the mean times of the progressed moments of birth on the dates, vary from 6 to 9 minutes. But in extreme cases, the difference may amount to nearly 30 minutes. As one day measures to one year of life, a difference of 30 minutes in the progressed moment will produce in the time measured to, a difference of about 7 days in the secondary directions of the Progressed to the Radical, and of about 10 days in the secondary directions of the Progressed bodies to the other Progressed bodies (let alone the progressed angles for the present) It may be argued that since the difference, at its greatest, is very small, and that since time measured to in secondary directions do not clinch the date when the directions bear fruit, we might take the mean time of birth throughout to facilitate calculations. But scientific precision requires us to go by apparent time in preference to mean-time. Therefore, I shall take the apparent time of birth as the progressed moment and proceed to cast the progressed horoscopes in George V's nativity.

**63. Progressed Horoscopes**—We have determined the progressed dates in Article 61, and the progressed moments of the mean time of birth on each progressed date in Article 62. It now remains to cast the progressed horos-

\* The local mean-times do not differ from the Greenwich mean times, when both of them and the equation of time are taken correct to a minute since London, the birth-place is only 37 seconds west of Greenwich.

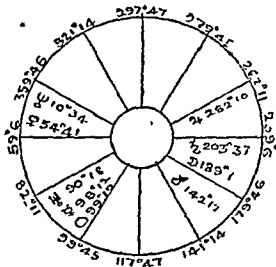


Fig XIV—George V's Progressed Map  
for the 29th year, corresponding to the  
progressed date, 1 23 a m, GMT  
July 1, 1865

Fig XV—George V's Progressed Map  
for the 45th year, corresponding to the  
progressed date, 1 26 a m, GMT  
July 17, 1865

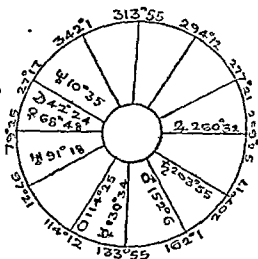
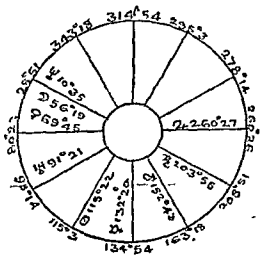


Fig XVI—George V's Progressed Map  
for the 46th year, corresponding to the  
progressed date, 1 26 a m, GMT  
July 18, 1865



### Schedule XVII--The Longitudes of Bodies on the Progressed Dates

[illegible]

### Schedule XVIII—The Declinations of Bodies on the Progressed Dates

[illegible]

copies in George V's nativity for the mean times of birth on the several progressed dates. They are cast precisely like the horoscope of birth. But it is unnecessary to erect maps for all the horoscopes, as it will do to prepare a schedule of the longitudes and declinations of every body on each progressed date.

Problem 32—Find the longitudes and the daily motions of the two angles, the seven planets and the two luminaries at the *Greenwich mean times* of birth corresponding to 1 20 a m, apparent time, on the seven progressed dates of July 1, 2, 9, 10, 17, 18 and 19, 1865.

See Schedule XVII, for the solution of the problem.

Problem 33—Find the declinations and the daily motions in declination of the two angles, the seven planets and the two luminaries at the *Greenwich mean times* corresponding to 1 20 a m, apparent time, on the seven progressed dates of July 1, 2, 9, 10, 17, 18 and 19, 1865.

See Schedule XVIII, for the solution of the problem.

## LESSON VIII

### SECONDARY DIRECTIONS TO THE RADICALS

**64 Secondary Directions of the Progressed to the Radicals**—In this class of secondary directions the progressed body is the directed body, and the radical body is the stationary position. But the progressed angles cannot be directed, though bodies can be directed to them, for the angles are fixed mundane points with no progression of their own. An aspect is measured, as usual, either way from the radical body. As there are nine progressed bodies and eleven radicals (nine bodies and two angles), the possible number of sets of directions, each with the same progressed and radical body, is ninety nine. The aspects directed to may be any one or more of the twelve aspects, including the parallel. The arc of direction is the angular distance from the progressed body to the limit where the aspect falls. Time is measured at the rate of one year for every one day of progression. In the notation of directions, the small letter "p" standing for 'progressed' is inserted after the symbol of the progressed body, and the small letter "r" standing for 'radical' after that of the radical body, e.g., O p Δ O r

**65 Determination of the Arc of Direction**—To find all the secondary directions between all the progressed bodies and the radicals, first prepare two schedules, (i) of the longitudes with the daily motions of each progressed body on every progressed date in the required period (see Schedule XVII) and (ii) of the limits of the full cycle of the eleven aspects measured from each radical (see Schedule XIX). Next, take the series of longitudes of a progressed body as given in Schedule XVII, and see which, if any, of the aspect extents as given in Schedule XIX, falls within the whole range of the longitudes of the progressed body, during the period chosen. If any aspect so falls, note (1) the progressed body, (2) the daily motion of the body, (3) the calendar year measured to by the progressed date corresponding to the longitude of the progressed body, (4) the symbol of the radical, (5) the anti clockwise distance from each progressed body to the limit, and (6) the symbol of the aspect. The daily motion on a date, of a progressed body is the difference between its longitude on the date and that on the next succeeding date. For example, the daily motion on the sixteenth of a month is the difference between the longitude on the 16th and that on the 17th. The arc of direction is item (4), i.e., the anti clockwise distance from the progressed body to the limit. For example, in the illustrated nativity, taking the progressed

Schedule XIX.—Limits of the Aspects to the Radicals.

Asp.	$\psi$	$\chi$	$\nu$	$\phi$	$\theta$	$\delta$	$D$	$h$	$\pi$	M.C.	Ascend.										
Increa- sing																					
$\delta$	$10^{\circ}$	$10^{\circ}$	$39^{\circ}$	$48^{\circ}$	$29^{\circ}$	$72^{\circ}$	$26^{\circ}$	$88^{\circ}$	$37^{\circ}$	$125^{\circ}$	$35^{\circ}$	$181^{\circ}$	$3^{\circ}$	$20^{\circ}$	$6^{\circ}$	$265^{\circ}$	$40^{\circ}$	$270^{\circ}$	$47^{\circ}$	$2^{\circ}$	
$\pi$	$40$	$10$	$69$	$39$	$78$	$29$	$102$	$26$	$118$	$37$	$155$	$35$	$211$	$3$	$234$	$6$	$295$	$40$	$300$	$47$	$32^{\circ}$
$\angle$	$55$	$10$	$84$	$36$	$93$	$29$	$117$	$26$	$133$	$37$	$170$	$35$	$226$	$3$	$249$	$6$	$310$	$40$	$315$	$47$	$47^{\circ}$
$*$	$70$	$10$	$99$	$39$	$108$	$29$	$132$	$26$	$148$	$37$	$185$	$35$	$241$	$3$	$264$	$6$	$325$	$40$	$330$	$47$	$62^{\circ}$
$Q$	$82$	$10$	$111$	$39$	$120$	$29$	$144$	$26$	$160$	$37$	$197$	$35$	$253$	$3$	$276$	$6$	$337$	$40$	$342$	$47$	$74^{\circ}$
$\square$	$100$	$10$	$129$	$39$	$138$	$29$	$162$	$26$	$178$	$37$	$215$	$35$	$271$	$3$	$294$	$6$	$355$	$40$	$0$	$47$	$92^{\circ}$
$\Delta$	$130$	$10$	$159$	$39$	$168$	$29$	$192$	$26$	$208$	$37$	$245$	$35$	$301$	$3$	$324$	$6$	$25$	$40$	$30$	$47$	$122^{\circ}$
$\square$	$145$	$10$	$174$	$39$	$183$	$29$	$207$	$26$	$223$	$37$	$260$	$35$	$316$	$3$	$339$	$6$	$40$	$40$	$45$	$47$	$137^{\circ}$
Bq	$154$	$10$	$183$	$39$	$192$	$29$	$216$	$26$	$232$	$37$	$269$	$35$	$325$	$3$	$348$	$6$	$49$	$40$	$54$	$47$	$146^{\circ}$
$\pi$	$160$	$10$	$189$	$39$	$198$	$29$	$222$	$26$	$238$	$37$	$275$	$35$	$331$	$3$	$354$	$6$	$55$	$40$	$60$	$47$	$152^{\circ}$
$\delta$	$190$	$10$	$219$	$39$	$228$	$29$	$252$	$26$	$268$	$37$	$305$	$35$	$1$	$3$	$24$	$6$	$85$	$40$	$90$	$47$	$182^{\circ}$
Decrea- sing																					
$\pi$	$220$	$10$	$249$	$39$	$258$	$29$	$282$	$26$	$298$	$37$	$335$	$35$	$31$	$3$	$54^{\circ}$	$6$	$115$	$40$	$120$	$47$	$212^{\circ}$
Bq	$226$	$10$	$255$	$39$	$264$	$29$	$288$	$26$	$304$	$37$	$341$	$35$	$37$	$3$	$60$	$6$	$121$	$40$	$126$	$47$	$218^{\circ}$
$\square$	$235$	$10$	$264$	$39$	$273$	$29$	$297$	$26$	$313$	$37$	$350$	$35$	$46$	$3$	$69$	$6$	$130$	$40$	$135$	$47$	$227^{\circ}$
$\Delta$	$250$	$10$	$279$	$39$	$288$	$29$	$312$	$26$	$328$	$37$	$5$	$35$	$61$	$3$	$84$	$6$	$145$	$40$	$150$	$47$	$242^{\circ}$
$\square$	$280$	$10$	$309$	$39$	$318$	$29$	$342$	$26$	$358$	$37$	$35$	$35$	$91$	$3$	$114$	$6$	$175$	$40$	$180$	$47$	$272^{\circ}$
!Q	$298$	$10$	$327$	$39$	$336$	$29$	$0$	$26$	$16$	$37$	$53$	$35$	$109$	$3$	$132$	$6$	$193$	$40$	$198$	$47$	$290^{\circ}$
$*$	$310$	$10$	$339$	$39$	$348$	$29$	$12$	$26$	$28$	$37$	$65$	$35$	$121$	$3$	$144$	$6$	$205$	$40$	$210$	$47$	$302^{\circ}$
$\angle$	$325$	$10$	$354$	$39$	$3$	$29$	$27$	$26$	$43$	$37$	$80$	$35$	$136$	$3$	$159$	$6$	$220$	$40$	$225$	$47$	$317^{\circ}$
$\pi$	$340$	$10$	$9$	$39$	$18$	$29$	$42$	$26$	$58$	$37$	$95$	$35$	$151$	$3$	$174$	$6$	$235$	$40$	$240$	$47$	$332^{\circ}$

Mercury on July 17, 1865, and the radical Saturn, we find that the longitude of progressed Mercury was  $130^{\circ} 34'$  with the daily motion of  $+1^{\circ} 46'$  on the day (see Schedule XVII), and that  $132^{\circ} 6'$ , the limit of the decreasing quintile aspect of Mercury to radical Saturn (see Schedule XIX) falls between  $130^{\circ} 34'$  and  $132^{\circ} 20'$ , the longitudes of  $\epsilon$  on July 17 and 18, 1865. So we note the secondary direction,  $\epsilon p Q \epsilon r$ , and its A D as  $132^{\circ} 6' - 130^{\circ} 34'$ , i.e.,  $1^{\circ} 32'$ .

66 The Time measured to by an arc of direction—In the above example, the daily motion of the progressed body on the day was  $1^{\circ} 46'$ , and the calendar year measured to by the progressed date, July 17, 1865, was the year commencing from June 3, 1909. As one day measures to one year of life, so the daily motion of the progressed body has to be spread over a whole year. The arc of direction which is a fraction of the daily motion, will, as such, measure to a proportionate part of a year. Therefore, we have the proportion —

The daily motion A D      twelve months      the number of months measured to  
So the number of months measured to is obtained by multiplying the arc of direction by 12, and dividing the product by the daily motion, or what is the same, by dividing the arc of direction by one twelfth of the daily motion. We shall adopt the latter method as we will be spared the multiplication, and will have a smaller divisor to operate with. In the above example, the number of months measured to will be  $1^{\circ} 32'$  or  $92 \times 1/12$  of  $1^{\circ} 46'$ , i.e.,  $92 - 8.83 = 10.42$  months. To reach the time measured to, with the number of months thus obtained, count onwards from the date of birth in the corresponding progressed year. It will do, if the time measured to is reckoned correct to the corresponding ordinal calendar month, since secondary directions do not clinch the events correct to days. For example, if the horoscope under illustration for the forty fifth day, July 17, 1865, is taken, the date will measure to the eleventh month in the year beginning from June 3, 1909. The eleventh month from June 3 1909, is April, 1910. Therefore, the time measured to by the secondary direction  $\epsilon p Q \epsilon r$  is April, 1910 and we note as follows —

$\epsilon p Q \epsilon r$

April 1910

Problem 34—Find all the secondary directions in George V's nativity of the progressed Sun to all the radicals which operated during the four years, June 3, 1893 to 4 1901 to 2, 1909 to 1910 and 1910 to 1911.

The longitudes of the progressed Sun ranged during the 4 days July 1 2 9 10, 17 18, and 18 19 from  $99^{\circ} 10'$  to  $100^{\circ} 7'$ ,  $106^{\circ} 47'$  to  $107^{\circ} 45'$ ,  $114^{\circ} 25'$  to  $115^{\circ} 22'$ , and  $115^{\circ} 22'$  to  $116^{\circ} 20'$ .

Let us take the radicals one by one in their order in the nativity, beginning, for the sake of convenience from the one with numerically the smallest longitude.

(1) To the Radical Neptune. Since no limit given in Schedule XIX falls within the four ranges of the longitudes of the Sun, so there will be no direction of the Sun to any aspect of Neptune.

(2) To the Radical Venus. The limit,  $99^{\circ} 39'$ , \* to the radical Venus, falls between  $99^{\circ} 10'$  and  $106^{\circ} 47'$ .

$\therefore$  The A.D. =  $99^{\circ} 39' - 99^{\circ} 10' = 29'$ .

$\therefore$  One twelfth of the daily motion of  $\odot$  was  $57 \div 12$ , i.e.,  $4^{\circ} 75'$ .

$\therefore$  The month measured to was  $29 \div 4^{\circ} 75'$ , i.e.,  $6^{\circ} 1$  months, or the 7th month from June, 1893. So we say, Op \*  $\pi$ ...December, 1893.

(3) To the Radical Mercury . Nil.

(4) To the Radical Sun...Nil.

(5) To the Radical Uranus .Nil.

(6) To the Radical Mars...Nil.

(7) To the Radical Moon .Nil.

(8) To the Radical Saturn...Nil.

(9) To the Radical Jupiter.

The limit,  $115^{\circ} 40'$ ,  $\pi$  to the radical Jupiter, falls between  $115^{\circ} 22'$  and  $116^{\circ} 20'$ .

$\therefore$  The A.D. =  $115^{\circ} 40' - 115^{\circ} 22' = 0^{\circ} 18'$ .

$\therefore$  One twelfth of the daily motion of  $\odot$  on the day was  $58' \div 12 = 4^{\circ} 83'$ .

$\therefore$  The month measured to was  $18 \div 4^{\circ} 83'$ , i.e.,  $3^{\circ} 7$  months or the 4th month from June 1910. So we say, Op  $\pi$   $\pi$ .. September, 1910

(10) To the Radical Meridian. Nil.

(11) To the Radical Ascendant ..Nil.

Problem 35—Find all the secondary directions in George V's nativity of the other eight progressed bodies to aspects of the eleven radicals during the four years, June 3, 1893 to 4, 1901 to 2, 1909 to 10 and 1910 to 1911.

(i) Progressed Neptune to the Radicals.. Nil.

(ii) Progressed Venus to the Radicals

$\pi$  p \* Asc. r  $36^{\circ} \div 44'$  Feb 1902

$\pi$  p  $\angle$   $\psi$  r  $29-40$ , Jan 1894

$\pi$  p \*  $\psi$  r  $25-47$ , Nov. 1910

$\pi$  p  $\Delta$   $\pi$  r  $51^{\circ} \div 475'$ , Apr 1910

$\pi$  p  $\square$   $\psi$  r  $18 \div 475$ , Sep 1909

$\pi$  p Bq M Cr  $6 \div 40$  June 1893,

(iii) Progressed Mercury to the Radicals.

$\pi$  p \*  $\pi$  r  $1^{\circ} 27' \div 11'$ , Feb 1894

$\pi$  p  $\angle$  Or  $0 15-10$ , July 1902.

$\pi$  p \* Or  $\angle$   $6-88$ , June 1910

$\pi$  p  $\angle$   $\psi$  r  $1 17-88$ , Feb 1911.

$\pi$  p  $\square$   $\psi$  r  $1^{\circ} 32' \div 88'$ , Apr 1910.

$\pi$  p  $\pi$   $\psi$  r  $0 30 \div 10$ , Sep. 1901

$\pi$  p  $\square$   $\psi$  r  $0 6-88$ , June 1907

(iv) Progressed Uranus to the Radicals.

$\pi$  p  $\pi$  MCr  $3 \div 033$  March 1901

(v) Progressed Mars to the Radicals.

$\pi$  p  $\pi$  Asc. r  $35 \div 31$ , May 1909,



## (vi) Progressed Moon to the Radicals

(1)	Dp Q Ascr	0° 36' -70,	June 1901	Dp * Ascr	5° 45' -70,	Nov 1910
	Dp * Ascr	12 36-70	May 1902	Dp $\angle$ Ascr	4 40-70	Oct 1909
(2)	Dp $\epsilon$ $\zeta$ r	1 9-60,	July 1893	Dp $\angle$ $\Psi$ r	12 45-70	Apr 1910
	Dp Q $\zeta$ r	8 42-70,	Jan 1902	Dp * $\Psi$ r	0 3-69	June 1911
	Dp $\omega$ $\Psi$ r	11 48-70	Apr 1909			
(3)	Dp $\pi$ $\zeta$ r	0 38-60,	June 1893	Dp $\omega$ $\zeta$ r	13 20-69,	May 1911
(4)	Dp Bq $\zeta$ r	3 28-60	Sep 1893	Dp $\Delta$ $\zeta$ r	12 36-70,	May 1901
	Dp $\pi$ $\zeta$ r	9 28-60	Mar 1894	Dp $\epsilon$ $\zeta$ r	6 5-70	Nov 1909
(5)	Dp $\Delta$ Or	3 25-60,	Sep 1893	Dp $\square$ Or	7 53-70	Jan. 1902
	Dp Bq Or	12 33-68,	May 1901			
(6)	Dp $\pi$ $\Psi$ r	9 9-70	Mar 1902	Dp $\angle$ $\Psi$ r	1 13-70	July 1909
	Dp Bq $\Psi$ r	1 17-70	July 1902	Dp $\omega$ $\Psi$ r	2 18-69	Aug 1910
(7)	Dp Q $\epsilon$ r	8 34-60	Feb 1894	Dp Q $\epsilon$ r	11 11-70,	Mar 1910
	Dp $\epsilon$ $\epsilon$ r	2 15-70,	July 1902	Dp * $\epsilon$ r	9 16 69	Jan 1911
(8)	Dp $\Delta$ Dr	11 35-70,	Apr 1902	Dp $\Delta$ Dr	4 44-69	Oct. 1910
	Dp $\square$ Dr	3 39-70,	Sep 1909			
(9)	Dp $\square$ $\zeta$ r	4 38-70,	Oct. 1901	Dp Bq $\zeta$ r	3 47-69	Sep 1910
	Dp $\pi$ $\zeta$ r	11 42-70,	Apr 1910	Dp $\square$ $\zeta$ r	12 47-69,	Apr 1911
(10)	Dp Q $\omega$ r	4 39-60	Oct. 1893	Dp Bq $\omega$ r	7 16-70	Dec. 1909
	Dp $\omega$ $\omega$ r	6 12-70,	July 1901	Dp $\pi$ $\omega$ r	13 16-70	May 1910
(11)	Dp Q MCr	9 46-60,	Mar 1894	Dp Bq MCr	12 23-70	Apr 1910
	Dp $\square$ MCr	3 23-70	Aug 1909	Dp $\pi$ MCr	4 28-69	Sep 1910,

## (vii) Progressed Saturn to the Radicals Nil

## (viii) Progressed Jupiter to the Radicals Nil

87 Secondary Directions to the Parallels of the Radicals—The arc of direction is determined in precisely the same manner as in secondary directions to the aspects of the radicals. To find all the parallels between all the progressed bodies and the radicals, first prepare two schedules, (i) of the declinations with the daily motions in declination of each progressed body on every progressed date during the required period (Schedule XVIII), and (ii) the declinations of the radicals (see Schedule XX) Next, take the series of declinations of the progressed body, and note all parallels which fall between the range of the declinations of each radical taken in succession\*. If any, note (1) the progressed body, (2) the daily motion in declination of the progressed body on the day, (3) the calendar year measured to by the progressed date corresponding to the declination of the progressed body, (4) the symbol of the radical, (5) the difference

\* A progressed body, when the range of its declinations is very wide as in the case of D, may be in parallel to the same radical more than once (see Fig XVII)

between the declination of the radical and the declination of the progressed body just after which the declination of the radical falls, and (6) the symbol of parallel. The daily motion in declination of a progressed body on a date is the difference between its declination on the date and that on the next succeeding date. The arc of direction is the difference between the declination of the radical and that of the progressed body just after which the declination of the radical falls. The number of months measured to by the arc of direction is found just in the same way as is described in Art 66. In Schedule XX below the radicals are arranged in the numerical order of their declinations to facilitate the spotting of all the parallels.

Schedule XX—Declinations of the Radicals

Asc.	D	ψ	♈	♉	♊	♋	♌	♍	♎	M.C.	♏
0° N 49	2° S 39	2° N 40	6° S 31	13° N 17	14° N 10	20° N 17	22° N 18	22° S 56	23° S 27	23° N 39	

Problem 36—Find in George V's nativity all the secondary directions of the progressed Sun to the parallel of all the radicals which operated during the four years June 3, 1893 to 4 1901 to 2 1909 to 10 and 1910 to 11.

The ranges of declinations of the progressed sun during the 4 progressed dates are from 22° 8 to 23° 4, 22° 24 to 22° 17, 21° 14 to 21° 6, and 21° 6 to 20° 54.

(i) To the Radical Neptune Nil.

(ii) To the Radical Venus Nil.

(iii) To the Radical Mercury Nil.

(iv) To the Radical Sun. Its declination is 22° 18. It falls just after 22° 24, the declination of the progressed Sun on July 9, 1865 which corresponds to June 3, 1901. The daily motion was 7.

The month measured to was 6-06, i.e., 10 or the 11th month from June 1909.

So we have Op 1 Or April 1902.

(v) To the Radical Uranus Nil.

(vi) To the Radical Mars Nil.

(vii) To the Radical Moon Nil.

(viii) To the Radical Saturn Nil.

(ix) To the Radical Jupiter Nil.

(x) To the Radical M.C. Nil.

(xi) To the Radical Asc Nil.

Problem 37—Find all the secondary directions in George V's nativity of the progressed bodies other than the Sun to the parallel of the eleven radicals which operated during the four years, June 3, 1893 to 4, 1901 to 2, 1909 to 10, and 1910 to 1911.

- (i) Progressed Neptune to the Radicals...Nil.
- (ii) Progressed Venus to the Radicals.. Nil.
- (iii) Progressed Mercury to the Radicals Nil.
- (iv) Progressed Uranus to the Radicals ...Nil.
- (v) Progressed Mars to the Radicals.  $\text{sp} \parallel \text{r } 1' - 1'1' \text{ June } 1902.$
- (vi) Progressed Moon to the Radicals.  
 $\text{dp} \parallel \text{r } 109 \div 18' \text{ Dec. } 1893. \quad \text{dp} \parallel \text{r } 5' \div 13' \text{ June } 1909.$   
 $\text{dp} \parallel \text{r } 18 \div 17 \text{ July } 1902.$
- (vii) Progressed Saturn to the Radicals ..Nil.
- (viii) Progressed Jupiter to the Radicals...Nil.

every other slower progressed body, as they stood on the first date. This is obtained by deducting the numerically smaller longitude from the greater, and rectifying it, in case it exceeds  $180^\circ$ , by subtracting it from  $360^\circ$ . Next, take the longitudes of the same set of two bodies on the next succeeding progressed date, and again find the shorter distance between them in the same way, rectifying it, if necessary. Similarly, find the shorter distance between each pair on the consecutive progressed dates included in the required period. Now we have a series of shorter distances between the same pairs of progressed bodies corresponding to every consecutive progressed date. The shorter distances between the same two bodies on consecutive progressed dates, may be numerically increasing or decreasing. In consequence, the extents of the aspects between two sets of bodies may be increasing or decreasing. Now, take in succession every two consecutive shorter distances between the same two bodies, and see if the extent of any aspect lies between them. If so, note (1) the swifter of the two as the directed body, (2) the slower or the other progressed body, (3) the difference between the aspect extent and the first of the two consecutive shorter distances, (4) the difference between the two consecutive shorter distances, (5) the symbol of the aspect whose extent intervenes between the two consecutive shorter distances, and (6) the calendar year measured to by the first of the two consecutive progressed dates. The arc of direction is the third item, that is, the difference between the aspect extent and the first of two consecutive shorter distances between which the aspect extent lies. If no aspect extent intervenes between two consecutive shorter distances, then no direction is possible between the two bodies concerned on the day under investigation and so none measure to the corresponding progressed year. In determining the aspect extent intervening between two consecutive shorter distances between the same two bodies, and more especially in determining the difference between two consecutive shorter distances between the same two bodies, one cannot be too careful when the two bodies approach their conjunction or opposition. As, at these two points, the shorter distances which have been decreasing or increasing till then cease to do so, and begin to become contrariwise. In the result, the real numerical difference between the consecutive shorter distances covering the conjunctive or oppositional point is much greater than what it appears to be. For example, in George V's nativity, the shorter distances between  $\text{Dp}$  and  $\text{vp}$  was  $174^\circ 18'$  on July 9, 1865, and  $173^\circ 51'$  on July 10, 1865. The difference between the two consecutive shorter distances between the two bodies on July 9, 1865 and July 10, 1865 appears to be  $174^\circ 18' - 173^\circ 51'$ , i.e.,  $0^\circ 27'$ , and the next higher aspect extent of  $180^\circ$  or the opposition does not appear to lie between the two shorter distances. But in reality, during the 24 hours between the moments of birth on July 9, 1865 and July 10, 1865, the shorter distance between the two bodies has risen from  $174^\circ 18'$  to  $180^\circ 0'$  and then

has fallen to  $173^{\circ} 51'$  due to rectification. So the difference between the shorter distances is  $(180^{\circ} - 174^{\circ} 18') + (180^{\circ} - 173^{\circ} 51')$ , i.e.,  $11^{\circ} 51'$  but not  $0^{\circ} 27'$  (see Problem 38). Again, the shorter distance between the same two bodies on July 24, 1865, was  $6^{\circ} 2'$ , and that on July 25, 1865, was  $4^{\circ} 55'$ . So, the difference between the two consecutive shorter distances appears to be  $6^{\circ} 2' - 4^{\circ} 55'$ , i.e.,  $1^{\circ} 7'$ , but it is really  $6^{\circ} 2' + 4^{\circ} 55'$ , i.e.,  $10^{\circ} 57'$ .

**70 Time measured to—**As one day measures to one year, so the difference between two consecutive shorter distances has to be spread over a whole year. Therefore, we have the proportion —

Difference between S D s    A D    12 months    month measured to  
For the reason stated in Article 66, the number of months measured to by an arc of direction is found by dividing the arc by one twelfth of the difference between the two consecutive shorter distances. To reach the time measured to with the number of months thus obtained count onwards from the date of birth in the corresponding progressed year. As before, it will do if the time measured to is reckoned correct to a calendar month.

**Problem 38—**Find in George V's nativity, all the secondary directions of progressed Moon to aspects of all the other eight progressed bodies, which operated during the four years, June 3, 1893 to 4, 1901 to 2 1909 to 10 and 1910 to 1911.

For the solution of the problem see the statements on Pages 92 and 93.

**Problem 39—**Find in George V's nativity all the secondary directions of all the progressed bodies other than Moon, to the aspects of all the other seven progressed bodies, which operated during the four years from June 3, 1893 to 4 1901 to 2 1909 to 10, and 1910 to 1911.

Progressed Neptune to the other Progressed Nil

Progressed Venus to the other Progressed

♂ p ☐ ♀ p 7-56 July 1909

♂ p \* ♀ p 50 57 Apr 1911

Progressed Mercury to the other Progressed

♂ p ♄ Op 58-74 Mar 1894

♂ p ♄ ♀ p 1-106 June 1909

♂ p ♀ p ♄ p 0-0 June 1902

♂ p ♄ ♀ p 81-105 Apr 1910

Progressed Sun to the other Progressed

Op ♀ p 2 67 June 1911

Progressed Uranus to the other Progressed Nil

Progressed Mars to the other Progressed Nil

Progressed Jupiter to the other Progressed Nil

**71 Secondary Directions to the Parallels of the other Progressed—**

Here too it is only the swifter body in its daily motion in declination that could

be directed to another body. The arc is determined in precisely the same manner as in directions to aspects of the other progressed (Art 68), except that the aspect extent of a parallel is, so to say,  $0^{\circ}$  in declination. The daily motions in declination of a progressed body varies very widely. To determine the arc of direction take the full series of declinations of a body on consecutive progressed dates during the required period, and take the declinations on the dates of one body in succession among the remaining eight progressed bodies, and see between what two dates the declinations of the two bodies coincide, having no regard to the names of the declinations. This is done by comparing the declination of each of the two bodies on the same date, to ascertain if they tend to meet or cross each other. They will tend to meet when their declinations are alike increasing or decreasing numerically and will tend to cross when one increases while the other decreases. Whether they meet or cross, note the two consecutive progressed dates between which they meet or cross, and find the difference between their declinations on the first of the two dates. This is the arc of direction. The number of months measured by the arc of direction, is found when the declinations of both bodies increase or decrease alike, by dividing the A.D. by one twelfth of the difference between their daily motions in declination on the first date. And when the declination of one increases numerically, while that of the other decreases, by dividing the A.D. by one twelfth of the sum of their daily motions in declination on the first date. Finally, take the body moving faster in declination as the directed body. Here too, one ought to be careful in finding the daily motions in declination of a body when it changes its course from north to south or south to north. For example, the declination of Moon on July 13, 1865 was  $2^{\circ} 55'$ , and on July 14, 1865,  $2^{\circ} 2'$ . So the daily motion in declination of Moon on the day was not  $0^{\circ} 53'$  but  $2^{\circ} 55' + 2^{\circ} 2'$ , i.e.,  $4^{\circ} 57'$ . For the ranges of declinations of the nine bodies on the consecutive progressed dates, see Schedule XVIII.

Problem 40—Find in George V's nativity all the secondary directions of each of the progressed bodies to the parallel of all the other progressed during the four years from June 3, 1893 to 4, 1901 to 2 and 1909 to 10, and 1910 to 11.

Progressed Neptune to the parallel of all the other Progressed Nil

Progressed Venus to the parallel of all the other Progressed Nil

Progressed Mercury to the parallel of all the other Progressed

7 p II 7 p 5-44 July 1910                      7 p II 2 p 2-21 July 1901

Progressed Sun to the parallel of the other Progressed Nil

Progressed Saturn to the parallel of all the other Progressed Nil

Progressed Mars and Jupiter to the parallel of all the other Progressed Nil

Progressed Moon to the parallel of all the other Progressed

2 p II 7 p 106-215 Dec. 1893

2 p II 7 p 114-33 Apr 1911

2 p II 7 p 5-162 June 1901



Shorter distances from p p to

Prog Date	y p	O p	i p	e p	u p	w p	k p	v p	Prog year
July 17	130 34	114 25	68 48	152 6	260 32	91 18	203 55	42 24	June 3
1865	42 24	42 24	42 24	42 24	42 24	42 24	42 24	10 35	1909
<hr/>									
	88 10	72 1	26 24	109 42	141 52	48 54	161 31	31 49	pQ O p June 1909
									pBq p July 1909
									p p Bq p Sep 1909
									p p u p Jan 1910
									p p k p May 1910
									p p l p May 1910
									p p * O p May 1910
July 18	132 20	115 22	69 45	152 43	260 27	91 21	203 56	56 19	June 3
1865	56 19	56 19	56 19	56 19	56 19	56 19	56 19	10 35	1910
	76 1	59 3	13 26	96 24	155 52	35 2	147 37	45 44	
<hr/>									
July 18	132 20	115 22	69 45	152 43	260 27	91 21	203 56	56 19	June 3
1865	56 19	56 19	56 19	56 19	56 19	56 19	56 19	10 35	1910
	76 1	59 3	13 26	96 24	155 52	35 2	147 37	45 44	
<hr/>									
									pBq p Sep 1910
									p p Q p Oct 1910
									p p x p Oct 1910
									p p a p Nov 1910
									p p Q p Nov 1911
July 19	134 6	116 20	70 42	153 20	260 22	91 24	203 57	70 7	June 3,
1865	70 7	70 7	70 7	70 7	70 7	70 7	70 7	10 35	1911
	63 59	46 13	0 35	83 13	169 45	21 17	133 50	59 32	



72. **The Graph Method**—When the reader finds it rather embarrassing to find all the secondary directions to parallel, he should draw a graph of the range of declinations of each body, marking the progressed dates on one side and the degrees of the declination on the other side of the graph. In the graph only the numerical variation in the declinations of each body should be shown, ignoring the names of the declinations. Every crossing of the graph lines of two bodies will show the date and the degree at parallel. Such a graph in George V's nativity for the 28 years from June 3, 1891 to June 3, 1919 would be as sketched below, in which the 25 parallels occurring during the period are shown as 25 circles, indicating the crossings.

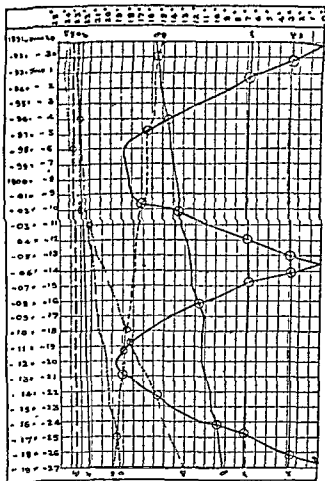


Fig XVII—The graph showing the curves traced by the declinations of all the bodies during the 28 years from June 3, 1891, to June 3, 1919.

73 **Are Progressed Horoscopes to be cast for Mean-time or Apparent time of birth?**—As already observed meantime is a conventional affair, but apparent time is natural time. If the apparent time of birth is taken as it ought to be, then the meantime equivalent of the apparent time of birth on a progressed date may differ from the meantime of birth on the birth date. Hence when the apparent time of birth is taken to cast progressed horoscopes, the time measured to will vary. But as secondary directions do not clinch correct to days, some are apt to ignore the point, and take the meantime of birth to cast progressed horoscopes but precision requires us to go by apparent time.

## LESSON X

### PROGRESSION OF THE ANGLES

**74 Can Progressed Angles be Directed?**—The zenith and the ascendant which are the Angles used, are fixed mundane points with no progression of their own, as they have no orbital revolution or annual motion. Nor could the ecliptic be held to progress, as it too has no orbital revolution. What is taken to be the progression of the angles is really due to *diurnal rotation*, a phenomenon which has no more to do with secondary directions than orbital revolution with primary directions. It is the practice to determine the angles at the birth moment on consecutive dates after birth, and to take the excess of longitude gained by them in one day as their daily motion. On this basis, the calculated arcs of directions are made to measure to a point of time in the corresponding progressed year. For example, in George V's nativity, progressed Ascendants on July 8 and 9, 1865, were  $68^{\circ} 59'$  and  $70^{\circ} 11'$ . So the daily motion of the Ascendant on the day is taken to be  $70^{\circ} 11' - 68^{\circ} 59' = 1^{\circ} 12'$ . And when the progressed Ascendant appears to reach during the day the longitude  $69^{\circ} 11'$ , that is,  $12' \div 1/12$  of  $1^{\circ} 12'$  or two hours after the birth moment, calculating as if the ascendant progressed slowly and directly from  $68^{\circ} 59'$  to  $69^{\circ} 11'$ , it is said to be in trine aspect to a radical whose longitude at birth was  $309^{\circ} 11'$ . The A D is said to be  $69^{\circ} 11' - 68^{\circ} 59' = 12'$ . The time measured to by the arc is held to be  $12' - 1/12$  of  $72'$ , i.e., two months from the birth date in the corresponding progressed year. Again, in regard to a progressed body whose progressed longitudes on July 8 and 9, 1865, were  $158^{\circ} 43'$  and  $160^{\circ} 19'$  respectively, the progressed ascendant is said to be in square aspect to the progressed body in the course of the day. For the two shorter distances are  $89^{\circ} 44'$  and  $90^{\circ} 8'$ , and the extent  $90^{\circ}$  of the square aspect lies between them. The arc is said to be 16. The time measured to by the arc is held to be  $16 \div 1/12$  of 24, i.e., 8 months from the birth date in the corresponding progressed year. All this rests upon the assumption that the daily motion of the progressed Ascendant is  $1^{\circ} 12'$ , that is, that it has progressed directly from  $68^{\circ} 59'$  to  $70^{\circ} 11'$  during the day. But it is by no means correct to take such a view. For, the ascendant has progressed really from  $68^{\circ} 59'$  to  $360^{\circ} 0'$  and from  $0^{\circ}$  to  $70^{\circ} 11'$  during the day, due to the diurnal rotation but not to annual motion. Consequently, its range of progress is from  $68^{\circ} 59'$  to  $360^{\circ}$  and from  $0^{\circ}$  to  $70^{\circ} 11'$ , i.e., in all  $361^{\circ} 12'$ . Therefore, the progressed Ascendant could be directed during the day not only to the trine of the radical and to the square of the progressed body, but to the full cycle of 22

aspects, both of the increasing and the decreasing series, to these bodies and to all others. Hence, if progressed angles could possibly be directed at all, we have to take their daily motions to be about  $361^\circ$ , and their directions to all the twenty two aspects and four parallels of every radical and progressed body resulting during a single progressed date and measuring to a single progressed year. Such an enormous number as, at least, 220 of its secondary directions to aspects of the radicals, and 44 to parallels of the radicals, and an almost equal number to the progressed bodies, all in one progressed date or progressed year, renders such directions to be of no value

**74 Can Progressed Angles be Directed to?**—Now, let us examine if progressed bodies could be directed to progressed angles. As the real daily motion of progressed angles is about  $361^\circ$ , they are vastly faster than the swiftest Moon. So none could be directed to them.

But it should be noted that progressed bodies could be directed to the radical angles, for radical angles are stationary points like all radical bodies, though radical angles could not be directed.

**Contention IV—Angles cannot be Progressed**

## LESSON XI

### SIMPLIFIED SECONDARY DIRECTIONS

75 "Planets at Noon" Method—To cast progressed horoscopes, we take the birth time on the progressed date, and find the positions of bodies by proportion from data given in ephemerides for Greenwich mean noon. To save the labour of having to work several proportions of daily motions, what is known as the "Planets at Noon" or "P.A.N." method is adopted. In this method, the positions of bodies at the Greenwich mean-noon before or after the birth time on the progressed dates are taken straight as they are, and entered in the maps for the respective progressed dates. As one day measures to one year, the positions at Greenwich mean noon will measure to a proportionate point of time before or after the birth date in the corresponding progressed year. For example, George V was born at 1 18 a.m., on June 3, 1865. In erecting his progressed maps, if we take the positions of bodies at the Greenwich mean noon following the birth time, then we should add to the birth date in the progressed years, the period measured to by the advanced 12 hours minus 1 hour 18 minutes, i.e., 10 hours 42 minutes. As one day measures to one year, so one hour will measure to 15 days and one minute to one fourth of a day. Therefore, 10 hours 42 minutes will measure to 163 days from June 3 in the progressed years, that is, to November 12. This is known as the Noon Date. But if the positions of bodies at Greenwich mean noon preceding the birth time are taken, then we should count 202 days back from June 3, and we reach again November 12, the Noon Date. In this method, the period of time denoted by an arc of direction is counted onwards from the noon date. But while the positions of planets are taken as they were at the Greenwich mean noons, the cusps are calculated for the birth time itself. In the progressed map it is noted that the planets are as at noon of the progressed date measuring to the noon date in the progressed year, but that cusps are as at birth moment on the progressed date measuring to the birth-date in the progressed year. Some go a step further, as if to improve matters, and find the cusps also at the Greenwich mean noon taken. But this is not done, as it ought to be done, by taking the sidereal time at the Greenwich mean noon chosen for finding the positions of planets, but by adding to or deducting from the cusps at birth time the proportionate value, taking that cusps progress only a few degrees in a day but not to about 361° odd as shown in Article 73. The reader is strongly urged not to spare himself a little honest labour to obtain a correct and vivid statement of facts, by adopting the usual method in preference to the P.A.N. method and its manipulations.

**76 The Radical System**—This is only a much simplified secondary direction to which no objection could be taken, as in the case of the P A N method. Mr Vivian E Robson, B Sc has published a lucid exposition on the subject, which should be consulted by those desirous of learning the system.

# PART III

## LESSON XII

### EPOCHAL ASPECTS

**77 Epochal Aspects**—Epochal Aspects are the zodiacal aspects formed at a particular epoch between two celestial bodies as they stood at the epoch. In all, the epochs adopted are five in number (i) Synodical Luration is the moment when the Sun and Moon stood after birth date at the same relative distance from one another as at birth, for the ordinal number of time corresponding to the ordinal number of year of life in which a given date falls (ii) Solar Revolution or Return is the moment just preceding a given date when the sun occupied the same longitude as at birth or at the moment of birth on the corresponding progressed date. (iii) Current Synodical Luration is the moment just preceding a given date when the Sun and Moon stood at the same relative distance from one another as at birth (iv) Lunar Revolution or Rotation is the moment just preceding a given date when Moon occupied the same longitude as at birth And (v) Birth Map is for the moment of birth on a given date The longitudes of the celestial bodies at each of these moments are determined in the usual way, and next the aspects subsisting between them, taking orbs (see Mathematical Astrology, Article 110) into consideration, are found So there are no arcs of direction in the cases of the epochal aspects These aspects are held to indicate incidents that are to be realised during the whole period between the epoch concerned and its succeeding one So, there is no measurement of time in the case of epochal aspects The new positions at an epoch are not referred to the radical or progressed positions of bodies as in directions, but only to the new positions of all other bodies at the same epoch

We shall take three important dates in George V's life to determine on each date all the five epochal aspects, (i) July 6, 1893 when he was in his twenty ninth year and married to the Queen, then Princess Mary, (ii) May 6, 1910 when he was in his forty fifth year and his father Edward VII died, and he was proclaimed the king and (iii) October 22, 1910 when he ascended the throne Only problems relating to the second date will be fully worked out

**78 Synodical Luration**—A Synodical Luration is the return of Moon after birth date to the same relative distance from the Sun, as it was at birth It takes approximately 29.5 days for Moon to make a synodic return As such, there are 12 synodic lurations in 354 days At the birth of a child Moon will generally be at some distance, forwards or backwards from the Sun Every 29.5 days after birth the synodical return of Moon to the same relative distance from the Sun that

it was at birth, takes place. It is held that the aspects subsisting between celestial bodies at a particular synodic lunation after birth, bear fruit in the same ordinal number of year of life as that of the synodic lunation. For example, at George V's birth Moon was  $108^{\circ} 37' 11''$  forwards from the Sun. This was the first synodic lunation, and the aspects between bodies subsisting at birth are held to have operated during the first year. The second synodic lunation when Moon was  $108^{\circ} 37' 11''$  forwards from the Sun, occurred at 6.41 p.m. G. M. T., on July 2, 1865, and so the aspects between bodies at 6.41 p.m. G. M. T., July 2, 1865, are held to bear fruit in the second year of life extending from June 3, 1866 to June 3, 1867. It will be evident that the epochal aspects at a synodical lunation are not strictly speaking epochal aspects as described in Article 77, but are intermediate between directional aspects and epochal aspects. For, they resemble directional aspects in bearing fruit at a remote period but not during the period immediately succeeding the epoch, as do the real epochal aspects, and they resemble the real epochal aspects in that they relate to the new positions of bodies at an epoch, but not to the radical or progressed positions of bodies as in directional aspects. So synodic lunations form a class by themselves.

**79 Determination of all the Epochal Aspects on a given date**—First find (1) the exact relative distance, correct to a second of arc, at which Moon stood from the Sun at birth, which is always obtained by deducting the Sun's longitude from Moon's longitude, previously adding  $360^{\circ}$  to Moon's longitude only when it is numerically less than that of the Sun (Dictum II). (2) The ordinal number of year containing the given date. (3) Then find the precise Greenwich mean time on the date after birth, when Moon stood at the same relative distance from the Sun for the same number of time as the ordinal number of the year of life containing the given date. The approximate date of the synodical lunation is found by multiplying the ordinal number of lunation minus one by 29.5 days, and counting onwards from the date of birth and its precise moment by proportion from data found in an ephemeris for the date. (4) Now, determine in the usual way, the longitudes of all bodies at the precise G. M. T. on the date after birth, and the cusps at the precise L. M. T. of synodic lunation. Lastly, (5) determine all the epochal aspects at the synodic moment.

**Problem 41**—Find all the epochal aspects at the Synodic Lunation, relative to July 6, 1893, in George V's nativity

Moon's longitude at birth was	$181^{\circ} 3' 4''$
The Sun's                    "	$72^{\circ} 25' 53''$
.. Moon was forwards from the Sun by	$108^{\circ} 37' 11''$
July 6, 1893, fell after June 3, 1893, i.e., in the 29th year	



The twenty ninth synodic lunation from birth occurred at  $(29-1) \times 29.5$ , i.e., 826 days after birth, i.e., on or about September 7, 1867

	D s Long	O s Long	For Dist of D	Diff
On 7 9 67 at G M N	270° 0 59' 1	164° 21 55 6	105° 39' 3 5	6° 26 59' 3
7/8 9 67 G M mid night	276 57 7 2	164 51 4 4	112 6 2 8	

The distance had to Moon gain at the synodic moment was  $108^{\circ} 37' 11'' - 105^{\circ} 39' 3.5$  i.e.  $2^{\circ} 58' 7.5$

The distance gained by Moon over the Sun in 12 hours was  $6^{\circ} 26' 59'' \times 3$   
 $6^{\circ} 26' 59' 3 \times 2^{\circ} 58' 7.5$  12 hours hours from the G M N of 7 9 67  
 Dividing by 4 we have  
 $1^{\circ} 36' 44.9 \times 0^{\circ} 44' 31.9 \times 3$  hours  $\frac{1}{4} \times$

The terms of the ratio have to be divided by 4 to bring them within the compass of the Table of Ternary Proportional Logarithms. When the two terms of the first ratio are divided the result obtained need not be multiplied by the divisor used but when the third is divided the result obtained should be multiplied by the divisor taken (see Mathematical Astrology, Articles 51 and 200)

(a.c.)  $9.73037 + 0.60661 + 0.00000 = 0.33698$  T P L. of 1 hr 22 m 51 s  
 ••The synodic moment on September 7 1867, when Moon was at the same forward distance of  $108^{\circ} 37' 11''$  from the Sun was 1 hr 22 m 51 s  $\times 4$  or 5 hr 31 m 24 s p.m. G M T or 5 hr 30 m 47 s L M T on September 7, 1867, when the R. A. M. C. was  $249^{\circ} 1' 15''$ . To test if the moment arrived at is correct, find the diurnal proportional arcs of the Sun and Moon for the odd period and apply it to their respective previous positions taken from the ephemeris and see if Moon is forwards of the Sun by exactly the same distance. Having tested your result cast the horoscope for G M T 5 hr 31 m 24 s p.m. or L M T 5 hr 30 m 47 s p.m. on September 7 1867. And now find all the epochal aspects including the parallel of declination between the several pairs of bodies

Problem 42—Find all the epochal aspects at the Synodical Lunation relative to May 6 1910 in George V's nativity

Moon was forwards from the Sun at birth by  $108^{\circ} 37' 11''$

May 6 1910 fell in the 45th year of his life

The 45th synodic lunation was  $(45-1) \times 29.5$  or 1298 days from birth i.e. on or about December 22 1868

	D s Long	O s Long	For Dist of D	Diff
23 12 68 G M N	16° 36 17" 4	272° 1 5" 1	104° 35 7 3	5° 40 29' 4
23/24 12 68 mid night	22 47 15 8	272 31 39 1	110 15 36 7	

The distance Moon had to gain at the synodic moment was  $108^{\circ} 37' 11'' 0 - 104^{\circ} 35' 7'' 3$ , i.e.,  $4^{\circ} 2' 3'' 7$

The distance gained by Moon in 12 hours over the Sun was  $5^{\circ} 40' 29'' 4$

$5^{\circ} 40' 29'' 4 - 4^{\circ} 2' 3'' 7 = 12$  hours No of hours from the G M N

$1^{\circ} 25' 7'' 4 - 1^{\circ} 0' 30'' 9 = 3$  hours  $\frac{1}{2} \times$

$9.67477 + 0.47341 + 0.00000 = 0.14818$  T P L of 2 hr 7 m 58 s

And 4 times 2 hr 7 m 58 s is 8 hr 31 m 52 s

The moment of the synodic lunation was 8 hr 31 m 52 s p.m. G M T or 8 31 15 p.m. L M T on December 23 1868 when R A M C was  $40^{\circ} 29' 0''$  Now cast the horoscope for G M T 8 31 52 p.m. or L M T 8 31 15 p.m., on December 23 1868 And now find all the epochal aspects including the parallel of declination

Problem 43—Find all the epochal aspects at the Synodic Lunation, relative to October 22 1910 in George V's nativity

Moon was forwards from the Sun at birth by  $108^{\circ} 37' 11'' 0$

October 22 1910 fell in the 46th year of George V's life

The 46th synodic lunation was  $(46 - 1) \times 29.5306$ , 1328 days from birth i.e. on or about January 22 1869

	$\odot$ s Long	$\odot$ s Long	For Dist of $\odot$	Diff
22 1 69 G M N	$49^{\circ} 48' 17'' 0$	$302^{\circ} 34' 51'' 4$	$107^{\circ} 13' 25'' 6$	$6^{\circ} 0' 15'' 6$
22/23 1 69 mid night	56 19 2 6	303 5 21 4	113 13 41 2	

The distance Moon had to gain at the synodic moment was  $108^{\circ} 37' 11'' 0 - 107^{\circ} 13' 25'' 6$  i.e.  $1^{\circ} 23' 45'' 4$

$6^{\circ} 0' 15'' 6 - 1^{\circ} 23' 45'' 4 = 12$  hours No of hours from G M N of 22 1 69

$1^{\circ} 30' 3'' 9 - 0^{\circ} 20' 56'' 4 = 3$  hours  $\frac{1}{2} \times$

$9.69928 + 0.93431 + 0.00000 = 0.63359 =$  T P L of 0 hr 41 m 51s

And 4 times 0 hr 41 m 51s = 2 hr 47 m 24s

The moment of the synodic lunation was 2 hr 47 m 24 s p.m. G M T or 2 46 47 L M T on January 22 1869 when the R A M C was  $343^{\circ} 41' 0''$  Now cast the horoscope for the G M T 2 hr 47 m 24 s p.m. i.e. L M T 2 46 47 p.m. And now find all the epochal aspects including the parallel of declination

80 Solar Revolution or Return—Solar Revolution is the return of the Sun to the same longitude as it was at birth. This occurs once in a year about the

birth day It is held that the aspects subsisting between celestial bodies at the moment when the Sun occupies the same longitude as at birth, operate during the year succeeding the moment For example, at George V's birth the Sun was at  $72^{\circ} 25' 53'' 6$ , and the effects of the aspects subsisting at the moment in every year when the Sun was at  $72^{\circ} 25' 53'' 6$ , are said to be felt during the whole year succeeding the moment It will not do to take the Sun's longitude at birth correct to a minute of arc, but it should be taken correct to a second of arc or even to one tenth of a second of arc For, if the longitude is taken correct to a minute of arc, an error of one minute in the Sun's longitude will cause an error of about 24 minutes of time, as Sun moves approximately 60 minutes of arc in one day or 1440 minutes of time, and an error of 24 minutes of time will produce an error of about 14 minutes of arc in Moon's longitude, and about 6 degrees in the longitudes of the cusps The approximate moment of return is readily found from an ephemeris and the precise moment by proportion as usual The map of the heavens erected for the moment of the solar revolution or return in a year is also known as the **birth-day map**; for the solar returns take place usually about the birth date in every year The aspects bear fruit during the year extending from one solar return to the next

**Problem 44**—Find all the epochal aspects at the Solar Revolution, relative to July 6, 1893, in George V's nativity

The longitude of the Sun at birth was  $72^{\circ} 25' 53'' 6$

July 6, 1893, fell in the 29th year measuring from June 3, 1893

The solar return was on or about June 3, 1893

	O s Long	Daily motion
2 6 93 G M N	$72^{\circ} 6' 59'' 9$	$0^{\circ} 57' 25'' 2$

3 6-93 G M N                      73 4 25 1

The Sun had to advance  $72^{\circ} 25' 53'' 6 - 72^{\circ} 6' 59'' 9$ , i.e.,  $0^{\circ} 18' 53'' 7$

$0^{\circ} 57' 25'' 2 - 0^{\circ} 18' 53'' 7 = 24$  hours No of hours from G M N, 2 6 93

Dividing the third term by 8, we get

$9.50379 + 0.97892 + 0.00000 = 0.48271$ , T P L, 0 hr 59 m 14 s

Now multiply 0 hr 59 m 14 s by 8 and we get 7 hr 53 m 52 s

The solar return was at 7 53 52 p.m. G M T or 7 53 15 p.m., L M T on June 2, 1893, when the R A M C was  $189^{\circ} 49' 0''$ . Now cast the horoscope for 7 53 52 p.m. G M T, or 7 53 15 p.m. L M T on June 2, 1893 And now find all the epochal aspects

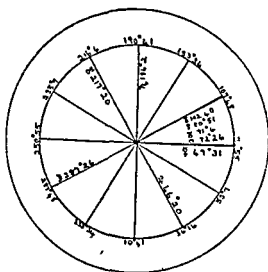


Fig. XVIII—Map for June 2, 1893

## Declinations.

M C	4 S 14
Asc.	22 S 5
☉	22 N 18
☽	27 S 20
♂	22 N 15
♀	23 N 33
♂	24 N 2
♂	15 N 49
♂	0 S 3
♂	13 S 33
♂	20 N 39

	♂	♀	♂	♂	♂	☉	♀	♂
☽	S □	A Q	S Bq	S Δ	S ♂	A Bq		S Bq
♂	S Δ	S π	A ♂			A ♂ &		
♀		A Q						
☉	S Δ	S Bq	S ♂		S Δ			
♂	S □	S Δ	S Δ	A *				
♂								
♂	S Δ							
♂	A Δ							

Problem 45—Find all the epochal aspects at the Solar Revolution, relative to May 6, 1910, in George V's nativity.

The longitude of the Sun at birth was  $72^{\circ} 25' 53'' 6$ .

May 6, 1910, fell in the 45th year measuring from June 3, 1909.

∴ The solar return was on or about June 3, 1909.

	O's. Long.	Daily motion.
3-6 09 G.M.N.	$72^{\circ} 14' 25'' 1$	$0^{\circ} 57' 24'' 7$
4 6 09 G.M.N.	$73 11 49 '8$	

The sun had to gain  $72^{\circ} 25' 53'' 6 - 72^{\circ} 14' 25'' 1$ , i.e.,  $0^{\circ} 11' 28'' 5$ .

∴  $0^{\circ} 57' 24'' 7 - 0^{\circ} 11' 28'' 5 = 24$  hours: No of hours from G.M.N. 3 6-09.

Dividing the third term by 8, we get,

$9^{\circ} 50373 + 1^{\circ} 19552 + 0^{\circ} 00000 = 0^{\circ} 69925$ , T.P.L. of 0 hr. 35 m. 58 6 s.

And 8 times 0 hr. 35 m. 58.6 s = 4 hr. 47 m. 49 s.

The solar return was at 4 hr. 47 m. 49 s. p.m., G.M.T., or 4 hr. 47 m. 12 s. p.m., L.M.T., on June 3, 1909, when R.A.M.C. was  $143^{\circ} 17' 45''$ .

Now cast the horoscope for G.M.T., 4-47-49 p.m., or L.M.T., 4-47-12 p.m. on June 3, 1909. And now find all the epochal aspects.

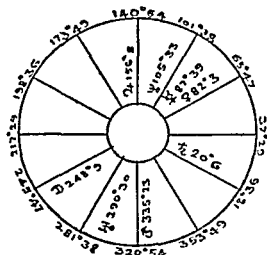


Fig XIX—Map for June 3, 1909

#### Declinations

M. C.	14 N 32
Asc	14 S 1
O	22 N 18
D	20 S 54
☿	23 N 0
♀	23 N 43
♂	12 S 10
♂	10 N 23
♂	5 N 42
♂	22 S 21
♂	21 N 51

	♈	♉	♊	♋	♌	♍	♎	♏
☿	S ∟ &	A Bq	S Δ	S □		S □	A θ &	
♀	S ∟ &		S *		A θ &			
O	A Bq &		A *	S □		S □		
♂	A ∟		S ∟	A θ &	S Δ			
♂								
♂	S □		S □					
♂	A □	S □						
♂	A θ &							

Problem 46—Find all the epochal aspects at the Solar Revolution, relative to October 22, 1910, in George V's nativity.

The longitude of the Sun at birth was  $72^{\circ} 25' 53'' 6$ .

October 22, 1910, fell in the 46th year measuring from June 3, 1910.

∴ The solar return was on or about June 3, 1910.

	O's. Long.	Daily motion.
3 6 1910 G.M.N.	$72^{\circ} 0' 37'' 4$	
4 6 1910 G.M.N.	$72^{\circ} 58' 5'' 0$	$0^{\circ} 57' 27'' 6$

The Sun had to gain  $72^{\circ} 25' 53''6 - 72^{\circ} 0' 37''4$ , i.e.,  $0^{\circ} 25' 16''2$ ,

$\therefore 0^{\circ} 57' 27''6 : 0^{\circ} 25' 16''2 :: 24 \text{ hours} : \text{No. of hours from G.M.N. 3-6-10.}$

Dividing the third term by 8, we get,

$9^{\circ} 50' 409 + 0^{\circ} 85' 266 + 0^{\circ} 00' 000 = 0^{\circ} 35' 675$ , T.P.L. of 1 hr. 19 m. 9.8 s.

And 8 times 1 hr. 19 m. 9.8 s = 10 hr. 33 m. 18.4 s.

$\therefore$  The solar return was at 10 hr. 33 m. 18 s. p.m., G.M.T., or 10-32-41 p.m., L.M.T. on June 3, 1910, when R.A.M.C. was  $229^{\circ} 40' 0''$ .

Now cast the horoscope for G.M.T. 10-33-18 p.m. or L.M.T. 10-32-41 p.m., on June 3, 1910. And now find all the epochal aspects.

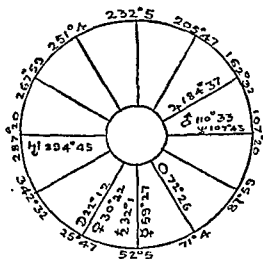


Fig XX—Map for June 3, 1910

#### Declinations

M.C.	18 S 18
Asc	22 S 21
☉	22 N 18
☽	5 N 45
♂	16 N 27
♀	9 N 31
♂	23 N 10
♂	0 S 32
♂	10 N 1
♂	21 S 41
♂	21 N 38

	♂	♀	♂	♂	♂	♂	♂	♂
♂		A □	S □			S □		S □
♀		S □		A □ &	S □	S □		S □
☉	S △	S □ &			S □			
♂		A □ &	S □ &					
♀	S △	A △		S □				
♂		S □						
♂								
♂								

**81. Solar Return to the Progressed Sun**—According to some, the moment when the Sun returns to its longitude on the progressed date corresponding to the year of the give date, instead of to the longitude of the radical Sun as in Article 80, is taken. For, the Sun while he completes the ecliptic circle in one year, does not move through  $360^\circ$  with reference to a place, but does so only when he has moved through  $361^\circ$  ecliptic degrees. In other words, it is only after one year and one day, that the Sun returns to the same mundane position after birth. The horoscope for the moment of the solar return to the progressed longitude of the Sun is cast, and all the epochal aspects are determined. If this system is adopted, then a progressed day will measure not to one year but to one year and one day; and consequently the anniversary of birth will not fall on the date of birth in every year but one day after birth for every subsequent year. These aspects are held to bear fruit during the year and one day from the solar return to one progressed position to the solar return to the succeeding progressed position.

**Problem 47**—Find all the epochal aspects at the moment of Solar Return to the progressed longitude of the Sun, relative to July 6, 1893, in George V's nativity.

July 6, 1893 fell after the twenty-ninth birth-date, June 3, 1893, and the twenty-ninth progressed date is July 1, 1865.

The Sun's longitude at the A.T. of birth, i.e., at 13 hr. 23 m. 39 s. or 1-24 a.m. G.M.T. on July 1, 1865, was  $99^\circ 9' 55''$ .

	☉'s Long.	Daily motion,
30-6-93	$98^\circ 51' 5''$	$0^\circ 57' 11''$
1-7-93	$99^\circ 48' 16''$	

The Sun had to gain  $99^\circ 9' 55'' - 98^\circ 51' 5''$ , i.e.,  $0^\circ 18' 50''$ .

$\therefore 57' 11'' : 18' 50'' :: 24 \text{ hours} : \text{No. of hours from G.M.N. of 30-6-1893.}$

Dividing the third term by 8, we have,

$9^\circ 50' 20'' + 98035 = 0^\circ 48' 235$ , T.P.L. of 0 hr. 59 m. 17.1 s.

$\therefore$  The moment of Solar Return to its longitude on the corresponding progressed date was 7 hr. 54 m. 17 s. after G.M.N. on 30-6-1893, i.e., 7-54-17 p.m. G.M.T. or 7-53-40 p.m. L.M.T., when the R.A.M.C. was  $217^\circ 30' 45''$ .

Now cast the horoscope for the moment of return on June 30, 1893, and find all the epochal aspects.

**Problem 48**—Find all the epochal aspects at the Solar Return to the Progressed longitude of the Sun, relative to May 6, 1910, in George V's nativity.

The Sun's longitude at the A.T. of birth on the 45th progressed date, i.e., at G.M.T. 1-26 a.m. on July 17, 1865, was  $114^\circ 25' 14''$ . The Sun returned to the progressed longitude,  $114^\circ 25' 14''$ , in the 45th year at 4-46-15 p.m. G.M.T., i.e., 4-45-38 p.m. L.M.T. on July 17, 1909, when the R.A.M.C. was  $186^\circ 16' 15''$ .

Now cast the horoscope for the moment of return on July 17, 1909, and find all the epochal aspects

**Problem 49**—Find all the epochal aspects at the Solar Return to the Progressed longitude of the Sun, relative to October 22, 1910, in George V's nativity

The Sun's longitude at the A T of birth on the 46th progressed date i.e., at 1 26 a.m. G M T, on July 18, 1865 was  $115^{\circ} 22' 29''$ . The Sun returned to the progressed longitude,  $115^{\circ} 22' 29''$ , at 10 24 0 p.m. G M T or 10 23 23 p.m. L M T on July 18, 1910, when the R.A.M.C. was  $271^{\circ} 41' 15''$

Now cast the horoscope for the moment of Solar Return on July 18, 1910, and find all the epochal aspects

It may be observed that the validity of Solar Return to the progressed longitude is questionable. For example, if Problem 48 is worked out, and the aspects will be found not quite significant as compared with those given in the corresponding Problem 45

**82 Current Synodical Lunations**—Current Synodical Lunations are those just preceding a given date. So when a date is given we should ascertain the moment just previous to it, at which moon was at the same relative distance from the Sun as at birth. The effect of the aspects formed at the moment are viewed to be realised during the synodic month of 29.5 days from the moment. These returns are called **current synodical lunations**, to distinguish them from the lunation described in Article 79

**83 Determination of all the aspects at a Current Synodical Lunation**—A Synodical Lunation occurs once in 29.5 days and so Moon gains in elongation on an average  $12^{\circ}$  daily. Always we want to know the moment of the just previous synodic lunation. So we should find (i) the distance of Moon from the Sun at birth, and (ii) the date and the precise G M T of the synodic lunation just previous to the given date. The former is easily found as usual by deducting the Sun's longitude at birth from Moon's longitude at birth, applying Dictum II when necessary. To find the latter we should ascertain the distance of Moon from the Sun at G M N on the given date by subtracting the Sun's longitude from Moon's, adding  $360^{\circ}$  to Moon's position if it is numerically less (Dictum II) and taking the difference with no rectification as the distance from the Sun to Moon on the date. Next divide the distances at birth and at G M N on the given date both taken correct to a degree by 12 to find the Age of Moon in days. The Age of Moon on the given date may be greater or less than its age at birth. The maximum Age of Moon, taken approximately, is 30 days. When the Age of Moon on the given date is greater the difference between the two ages gives the number of days we have to count back from the given date to reach the day of the previous synodic lunation and when the Age of Moon on the given date is less, add 30 to it and deduct the



Age of Moon at birth, and with the number of days obtained count back from the given date to get at the day of the previous lunation. Now, take an ephemeris for the year and find the positions of the Sun and Moon on the date counted back, and ascertain the precise moment of the synodic lunation, and cast the horoscope for the moment of synodic lunation, and find all the aspects subsisting at the moment.

**Problem 50**—Find all the epochal aspects at the Current Synodical Lunation, relative to July 6, 1893, in George V's nativity.

At birth the distance from the Sun to Moon was  $108^{\circ} 37' 11'' 0$ , i.e., the approximate Age of Moon was 9 days.

At G.M.N. on July 6, 1893, the approximate distance from the Sun to Moon was  $360^{\circ} + 9^{\circ} - 104^{\circ}$ , i.e.,  $265^{\circ}$ , and so Moon's Age was 22 days. On the given date Moon is older than at birth. So counting back  $22 - 9$ , i.e., 13 days from July 6, 1893, we reach June 23, 1893.

On reference to an ephemeris for 1893 we find the following data:—

	$\odot$ 's Long.	$\circ$ 's Long.	Distance.	Diff.
22 6-1893 G.M.N.	$197^{\circ} 5' 50'' 5$	$91^{\circ} 13' 31'' 8$	$105^{\circ} 52' 18'' 7$	
				$5^{\circ} 34' 46'' 2$
22 6 1893 G.M.M.	$203^{\circ} 9' 13'' 2$	$91^{\circ} 42' 8'' 3$	$111^{\circ} 27' 4'' 9$	

The distance Moon had to gain was  $108^{\circ} 37' 11'' - 105^{\circ} 52' 18'' 7$ , i.e.,  $2^{\circ} 44' 52'' 3$ .

$\therefore 5^{\circ} 34' 46'' 2 \cdot 2^{\circ} 44' 52'' 3$ . 12 hours. No. of hours from G.M.N. of 22 6 93.

Dividing all the terms by 4, we have,

$9.667441 + 0.64019 + 0.00000 = 0.30760$ , T.P.L., of 1 hr. 28 m. 38.9 s

4 times 1 hr. 28 m. 38.9 s. is 5 hr. 54 m. 35 s.

$\therefore$  The moment of the previous current synodic lunation was 5 54 35 p.m. G.M.T. or 5 53 58 p.m. L.M.T., on June 22, 1893, when the R.A.M.C. was  $179^{\circ} 37' 45''$ .

Now cast the horoscope for 5 55 p.m. G.M.T., i.e., 5 53 58 p.m. L.M.T. on June 22, 1893, and find all the epochal aspects

**Problem 51**—Find all the epochal aspects at the Current Synodical Lunation, relative to May 6, 1910 in George V's nativity.

At birth the approximate Age of Moon was 9 days

At G.M.N. on May 6, 1910 the approximate distance from the Sun to Moon was  $360^{\circ} + 7^{\circ} - 45^{\circ}$ , i.e.,  $322^{\circ}$ , and so Moon's age was 27 days. On the given date Moon was older than at birth, so counting back  $27 - 9$ , i.e., 18 days from May 6, 1910, we reach April 18, 1910.

On reference to an ephemeris for 1910, we find the following data:—

	☿'s Long.	☼'s Long.	Distance.	Diff.
17/18-4-10 G.M.M.	134° 0' 43'' 8	27° 4' 51'' 4	106° 55' 52'' 4	5° 50' 16'' 7
18-4-10 G.M.N.	140 20 19 '2	23 34 30 '1	112 46 9 '1	

The distance Moon had to gain was  $108^{\circ} 37' 11'' - 106^{\circ} 55' 52'' 4$ , i.e.,  $1^{\circ} 41' 18'' 6$ .

$\therefore 5^{\circ} 50' 16'' 7 : 1^{\circ} 41' 18'' 6 :: 12 \text{ hours} : \text{No. of hours from G.M.M. of 13/18-4-10.}$

Dividing all the terms by 4, we have,

$9^{\circ} 687084 + 0^{\circ} 851681 + 0^{\circ} 000000 = 0^{\circ} 538765$ , T.P.L. of 0 hr. 52 m. 3' 6 s.

4 times 0 hr. 52 m. 3' 6 s. is 3 hr. 28 m. 4 s.

$\therefore$  The moment of the previous current synodic lunation was 3-28-14 a.m. G.M.T. or 3-27-37 a.m. L.M.T. on April 18, 1910, when the R.A.M.C. was  $257^{\circ} 16' 30''$ .

Now cast the horoscope for 3-28 a.m. G.M.T., i.e., 3-27-37 a.m. L.M.T. on April 18, 1910, and find all the epochal aspects.

Problem 52—Find all the epochal aspects at the Current Synodical Lunation, relative to October 22, 1910, in George V's nativity.

At birth the approximate Age of Moon was 9 days.

At G.M.N. on October 22, 1910, the approximate distance from the Sun to Moon was  $360^{\circ} + 83^{\circ} - 208^{\circ}$ , i.e.,  $235^{\circ}$ , and so Moon's age was  $235 \div 12$ , i.e., 19 days.

On the given date Moon was older than at birth, so counting back  $19 - 9$ , i.e., 10 days from October 22, 1910, we reach October 12, 1910.

	☿'s Long.	☼'s Long.	Distance.	Diff.
12/13-4-10 G.M.M.	305° 25' 8'' 6	198° 46' 38'' 9	106° 38' 29'' 7	6° 0' 12' 3
13-4-10 G.M.N.	311 55 3 '2	199 16 21 '2	112 38 42 '0	

The distance Moon had to gain was  $108^{\circ} 37' 11'' - 106^{\circ} 38' 29'' 7$ , i.e.,  $1^{\circ} 58' 41'' 3$ .

$\therefore 6^{\circ} 0' 12'' 3 : 1^{\circ} 58' 41'' 3 :: 12 \text{ hours} : \text{No. of hours from G.M.N. of 12/13-4-10.}$

Dividing all the terms by 4, we have,

$9^{\circ} 69922 + 7^{\circ} 8292 + 0^{\circ} 00000 = 0^{\circ} 48214$ , T.P.L. of 0 hr. 59 m. 18' 7 s.

4 times 0 hr. 59 m. 18' 7 s is 3 hr. 57 m. 15 s.

$\therefore$  The moment of the previous current synodic lunation was 3-57-15 a.m. G.M.T., i.e., 3-56-38 a.m. L.M.T. on October 13, 1910, when the R.A.M.C. was  $79^{\circ} 59' 30''$ .

Now cast the horoscope for 3-57 a.m. G.M.T., i.e., 3 56-38 a.m. L.M.T. on October 13, 1910, and find all the epochal aspects.

**84 Lunar Revolutions or Returns**—Lunar Revolution is the return of Moon to the same longitude as it was at birth. This occurs once in about 27 days. It is held that the aspects subsisting between bodies at the moment when Moon occupies the same longitude as at birth, bear fruit during the lunar month of 27 days succeeding the moment of return. For example, at George V's birth the longitude of Moon was  $181^{\circ} 3' 4'' 6$ , and the effects of the aspects subsisting at every lunar return, i.e., after about every 27 days from birth, are said to be felt during the 27 days succeeding the moment of return. The longitude of Moon may be taken correct to a minute of arc, for the difference of one minute of arc in the Moon's position will produce only an error of only two minutes of time. The approximate moment of return is readily found from an ephemeris and the precise moment is found by proportion as usual. The map erected for the moment of Lunar Return is also known as the monthly map.

**Problem 53**—Find all the epochal aspects at the Lunar Return just prior to July 6, 1893, in George V's nativity.

The longitude of Moon at birth was  $181^{\circ} 3' 4'' 6$

Just prior to July 6, 1893, Moon returned to its longitude at birth between the Greenwich mean mid night on June 20/21, 1893, and G.M.N. on June 21, 1893.

	D's Longitude	Motion during 12 hours
20/21 6 93 G.M. mid night	$175^{\circ} 31' 37'' 9$	
		$6^{\circ} 16' 3'' 2$
21 6 93 G.M.N.	$184^{\circ} 47' 41'' 1$	

Moon had to advance  $181^{\circ} 3' 4'' 6 - 175^{\circ} 31' 37'' 9$ , i.e.,  $2^{\circ} 31' 26'' 7$ .

$\therefore 6^{\circ} 16' 3'' 2 - 2^{\circ} 31' 26'' 7 = 12$  hours. No. of hours from the mid night

Dividing all the terms by 4, we have,

$9.71792 + 0.67708 + 0.00000 = 0.39500$ , T.P.L. of 1 hr. 12 m. 29 s.

4 times 1 hr. 12 m. 29 s. is 4 hr. 49 m. 58 s.

$\therefore$  The Lunar Return was at 4-49 58 a.m. G.M.T. or 4-49 20 a.m. L.M.T. on June 21, 1893, when the R.A.M.C. was  $341^{\circ} 56' 45''$ .

Now cast the horoscope for G.M.T. 4-50 a.m., i.e., L.M.T. 4-49 20 a.m. on June 21, 1893, and find all the epochal aspects.

Problem 54—Find all the epochal aspects at the Lunar Return just prior to May 6 1910, in George V's nativity

The longitude of Moon at birth was  $181^{\circ} 3' 4'' 6$

	D s Longitude	Motion during 12 hours
21 4 1910 G M N	$177^{\circ} 8' 20'' 5$	$5^{\circ} 59' 41'' 7$

21/22 4 1910 G M M  $183' 8' 2' 2$

Moon had to advance  $181^{\circ} 3' 4'' 6 - 177^{\circ} 8' 20'' 5$  i.e.,  $3^{\circ} 54' 44'' 1$

$5^{\circ} 59' 41'' 7 - 3^{\circ} 54' 44'' 1$  12 hours No of hours from the G M N

Dividing all the terms by 4, we have

$969860 + 48676 + 000000 = 018536$ , T P L of 1 hr 57 m 28 s

4 times 1 hr 57 m 28 s is 7 hr 49 m 52 s

The Lunar Return was at G M T 7 49 52 p.m. or L M T 7 49 15 p.m. on April 21, 1910 when the R A M C was  $146^{\circ} 18' 45''$

Now cast the horoscope for G M T 7 50 p.m. or L M T 7 49 15 p.m. on April 21 1910 and find all the epochal aspects

Problem 55—Find all the epochal aspects at the Lunar Return just prior to October 22 1910 in George V's nativity

\* The longitude of Moon at birth was  $181^{\circ} 3' 4'' 6$

	D s Longitude	Motion during 12 hours
2 10 10 G M N	$178^{\circ} 43' 53'' 0$	$6^{\circ} 10' 11'' 6$

2/3 10 10 G M M  $184' 54' 4' 6$

Moon had to advance  $181^{\circ} 3' 4'' 6 - 178^{\circ} 43' 53'' 0$  i.e.  $2^{\circ} 19' 11'' 6$

$6^{\circ} 10' 11'' 6 - 2^{\circ} 19' 11'' 6$  12 hours No of hours from the G M N

Dividing all the terms by 4 we have

$971109 + 071371 + 000000 = 042480$  T P L of 1 hr 7 m 40 9 s

4 times 1 hr 7 m 40 9 s is 4 hr 30 m 43 6 s

The Lunar Return was at G M T 4 30 44 p.m. or L M T 4 30 7 p.m. on October 2, 1910 when the R A M C was  $258^{\circ} 2' 15''$

Now cast the horoscope for the moment and find all the epochal aspects

86 Diurnal Map—Diurnal Map is the one cast for the moment of birth on a given date Usually the mean time of birth is taken According to some the apparent time of birth (see Article 72) on every day is taken and its mean time

equivalent is found and the horoscope is cast for it. We shall adopt the latter view. The aspects subsisting at the moment of birth on every day is held to portend events to transpire during the day.

Problem 56—Find all the epochal aspects at the Moment of Birth on July 6 1893, in George V's nativity.

The G M T of birth was 1 18 1 m

The L M T of birth was 1 17 23 m

The Equation of time on the date as applied to mean time was +2 m 13 s

Local Apparent time of birth was 1 19 36 m

The Equation of time as applied to apparent time at the midnight of July 5/6 was +4 m 26 s.

The L M T of birth on July 6 1893 was 1 24 2 a m, and the G M T was 1 24 39 a m, when the R A M C was  $305^{\circ} 16'$

Now cast the horoscope for the moment and find all the epochal aspects.

Problem 57—Find all the epochal aspects at the Moment of Birth on May 6 1910, in George V's nativity

The Local Apparent time of birth was 1 19 36 a m

The Eq. of time as applied to apparent time at G M midnight on May 5/6 1910 was -3 m 25 s

The L M T of birth on May 6 1910 was 1 16 11 a m and the G M T was 1 16 48 a m, when the R A M C was  $242^{\circ} 4'$

Now cast the horoscope for the moment and find all the epochal aspects.

Problem 58—Find all the epochal aspects at the Moment of Birth on October 22, 1910 in George V's nativity

The Local Apparent time of birth was 1 19 36 a.m

The Eq. of time as applied to apparent time at G M midnight on October 22/23 1910 was -15 m. 17 s

The L M T of birth on October 22 1910 was 1 4 19 a m or the G M T was 1 4 56 a.m when the R.A M C was  $45^{\circ} 40'$

Now cast the horo cope for the moment and find all the epochal aspects

# PART IV

## CURRENT ASPECTS

### LESSON XIII

#### TRANSITS

87 **Transits**—Transits are current aspects formed between the current positions of bodies and the radical or progressed positions of bodies and angles. A transit is the passage of a body over the radical or progressed positions of bodies and angles. The passage of a body over the point opposite to a radical or progressed position is also regarded to be a transit. So transits are conjunctions or oppositions. In order to differentiate these conjunctions and oppositions from the ordinary ones, they are termed **conjunctions by transit**, and **oppositions by transit**. Transits by the square and by the trine are adopted by some, but are of subordinate value, and transits by the other aspects are held to be too feeble to deserve notice. So, we have only four aspects to be noted in transits. The radical or progressed position passed over by a body is said to be the **transitted point or significator**. Of the four angles and the nine bodies only the two angles, the Mid heavens and the Ascendant, and the two luminaries, the Sun and Moon, are universally held to be the four important significators, and the remaining seven planets are taken to be significators of minor value. The body passing over a radical or progressed position is the **transitting body or promittor or exciter**, and it may be any one of the nine bodies. Jupiter, Saturn, Uranus and Neptune being tardy in motion, their transits over the significators last for a long period, and as such are viewed to be telling promittors. Mars being a body with considerable velocity, its transits are less lasting than the former, but decisive, and so important. Moon, Mercury, Venus and the Sun being quickly moving bodies, their transits are ephemeral, lasting only a few hours as in the case of Moon, or a few days as in the case of the rest. But the transits of the luminaries, the Sun and Moon, are held to be very effective, especially when they pass through the houses of a horoscope. To sum up, the transits of Mars, Jupiter, Saturn, Uranus and Neptune by conjunction, opposition, square and trine over the radical or the progressed positions of the four essential significators, the Mid heavens, the Ascendant, the Sun and Moon, are the only important transits to be determined.

Transits include also the New Moons, the Full Moons, and the Eclipses. New Moon or Moon when in conjunction with the Sun, and Full Moon or Moon when in

opposition to the Sun, are held to be very important transits. Always Solar Eclipses occur at a New Moon, and Lunar Eclipses at a Full Moon. So eclipses are also transits which are still more important than the ordinary New and Full Moons.

**83 Determination of Transits at a given time**—We have first to find the positions of Conjunction, Opposition, Square and Trine with the two angles and the two luminaries in particular, both at birth and at the moment of birth on the progressed date corresponding to the given time. These positions of each set of radicals and of the progressed may be arranged separately in their numerically increasing order, to facilitate the spotting of transits. Next, the range of positions of all the nine bodies during the given period should be noted.

*The given period may be one day or any longer period.* The range of the positions of a body during a period are its positions at the Greenwich mean midnights at the beginning and at the end of the period. Record also all Eclipses, New Moons, and Full Moons transpiring during the given period. This is generally done with the help of an ephemeris for the given time. Now all coincidences of the current positions of the nine bodies with the radical and progressed positions of the four aspects to the two angles and the two luminaries are noted as transits. For example, if we want to ascertain all the transits that operated in the 45th year of George V's life, that is, from June 3, 1909 to June 3, 1910, we take (i) the positions of the two angles and the two luminaries at birth, and (ii) their positions at the apparent moment of birth on the corresponding progressed date, i.e., 126 a.m. G M T on July 17, 1865. To each of these positions of either set, we add and subtract in succession the aspect extents of Conjunction, Square, Trine and Opposition, i.e.,  $0^\circ$ ,  $90^\circ$ ,  $120^\circ$  and  $180^\circ$ , to find the corresponding aspects by transit both of the decreasing and the increasing series. Next, the aspect positions of each set are arranged in their numerically increasing order. Lastly, refer to the ephemerides for 1909 and 1910, and take the range of longitudes passed through during the year June 3, 1909 to June 3, 1910 by each of the nine bodies. In transits over the Radicals the range of positions is the one from the position at the Greenwich mean midnight on June 3, 1909 to the position at the Greenwich mean midnight on June 3, 1910 and in the case of transits over the Progressed places, it is that from the midnight of July 17, 1909 to July 18, 1910. Now, spot all coincidences between the aspect positions and the current positions of each set, radical or progressed. The concurrences so marked off will be the Transits. In determining Transits, an orb of one or two degrees is usually allowed. Also note the radical and the progressed houses of a horoscope passed through by each body. Eclipses New Moons and Full Moons can be found from the aspectarian given in an ephemeris. Therefore, we should have two schedules prepared in regard to the aspect positions of (i) the Radicals and (ii) the Progressed. The schedule of the radical positions

and their aspects, no matter what the date may be, will be the same; but the schedule of the progressed positions and their aspects, will vary with each progressed date, and so a separate one should be prepared for each progressed date. For example, in George V's nativity Schedule XXI of the Radicals and their aspects will hold true for all given dates, but Schedules XXII, XXIII and XXIV of the Progressed positions and their aspects will relate to the three different dates selected, e.g., July 6, 1893, May 6, 1910, and October 22, 1910.

### The Radicals and their Aspects.

	Conjunction	Square	Trine	Opposition
Asc.	2° 3'	92° 3' 272 3	122° 3' 242 3	182° 3'
♈	10 10	100 10 280 10	130 10 250 10	190 10
♉	39 39	129 39 309 39	159 39 279 39	219 39
♊	48 29	138 29 318 29	168 29 288 29	228 29
♋	72 26	162 26 342 26	192 26 312 26	252 26
♌	88 37	178 37 358 37	208 37 328 37	268 37
♍	125 35	215 35 35 35	245 35 5 35	305 35
♎	181 3	271 3 91 3	301 3 61 3	1 3
♏	204 6	294 6 114 6	324 6 84 6	24 6
♐	265 40	355 40 175 40	25 40 145 40	85 40
M.C.	270 47	0 47 180 47	30 47 150 47	90 47

Now arranging these positions in their numerically increasing order we obtain the following schedule:—



## Schedule XXI—Radicals and their Aspects for the twenty-ninth year.

Position	Aspect	Position	Aspect
0° 47'	□ M.C.	180° 47'	□ M.C.
1 3	♄ ♃	181 3	♄ ♃
2 3	I Rad. House, & ♄ Asc.	182 3	VII Rad. House, & ♄ Asc.
5 35	△ ♄	190 10	♄ ♃
10 10	♄ ♃	192 26	△ ○
24 6	♄ ♃	201 6	♄ ♃
25 40	△ ♃	208 37	△ ♃
30 47	△ M.C.	215 35	□ ♄
35 35	□ ♄	219 39	♄ ♃
39 37	♄ ♃	228 29	♄ ♃
48 29	♄ ♃	228 41	VIII Rad. House
48 41	II Rad. House	242 3	△ Asc.
61 3	△ ♃	245 35	△ ♄
72 26	♄ ☉	250 10	△ ♃
72 36	III Rad. House	252 26	♄ ○
84 6	△ ♃	252 36	IX Rad. House
85 40	♄ ♃	265 40	♄ ♃
88 37	♄ ♃	268 37	♄ ♃
90 47	IV Rad. House, & ♄ M.C.	270 47	X Rad. House, & ♄ M.C.
91 3	□ ♃	271 3	□ ♃
92 3	□ Asc.	272 3	□ Asc.
100 10	□ ♃	279 39	△ ♃
109 7	V Rad. House	280 10	□ ♃
114 6	□ ♃	288 29	△ ♃
122 3	△ Asc.	289 7	XI Rad. House
125 35	♄ ♄	294 6	□ ♃
129 39	□ ♃	301 3	△ ♃
130 10	△ ♃	305 35	♄ ♄
133 41	VI Rad. House	309 39	□ ♃
138 29	□ ♃	312 26	△ ☉
145 40	△ ♃	313 41	XII Rad. House
150 47	△ M.C.	318 29	□ ♃
159 39	△ ♃	324 6	△ ♃
162 26	□ ☉	328 37	△ ♃
168 29	△ ♃	342 26	□ ○
175 40	□ ♃	355 40	□ ♃
178 37	□ ♃	358 37	□ ♃

**Problem 59**—Find all the transits over the radicals, relative to July 6, 1893, in George V's nativity.

The range of the current positions of the bodies from midnight to midnight on July 6, 1893, and their transits of houses were as:—

Transits				Transits			
♂	2° 35' to 16° 6'	XII and I		♂	53° 17' to 53° 30'		II
♂	104 6 to 105 3	IV		♂	186 40 to 186 42		VII
♂	129 52 to 131 3	V		♂	216 39		VII
♂	121 31 to 122 44	V		♂	72 15 to 72 17		II
♂	123 42 to 124 19	V					

On comparing these current positions with the aspect positions in Schedule XXI, we find the following transits over bodies:—

♂ ♂ Asc. r	♂ ♂ Asc. r
♂ ♂ ♂ r	♂ ♂ Asc. r
♂ ♂ ♀ r	♂ ♂ ♂ r
♂ ♂ ♀ r	♂ ♂ ♂ r
♂ ♂ ♀ r	♂ ♂ ♂ r

New Moon was on June 14, 1893, when the longitude of Moon was 83° 21', ♂ ♂ ♂ r. Full Moon was on June 29, 1893, when the longitude of Moon was 277° 40', ♂ ♂ ♂ r.

**Problem 60**—Find all the transits over the radicals, relative to May 6, 1910, in George V's nativity.

The range of the current positions of bodies, from midnight to midnights on May 6, 1910, and their transits of houses were as follows:—

Transits				Transits			
♂	359° 12' to 14° 0'	XII and I		♂	185° 41' to 185° 36'		VII
♂	44 35 to 45 33	I		♂	28 38 to 28 45		I
♂	64 53 to 65 32	II		♂	295 13		VI
♂	358 52 to 359 54	XII		♂	106 57		IV
♂	92 34 to 93 11	IV					

On comparing these current positions with the aspect positions in Schedule XXI, we find the following transits over bodies:—

♂ ♂ ♀ r	♂ ♂ ♀ r
♂ ♂ M.C. r	♂ ♂ ♀ r
♂ ♂ ♂ r	♂ ♂ M.C. r
♂ ♂ Asc. r	♂ ♂ Asc. r
♂ ♂ ♂ r	♂ ♂ ♂ r

New Moon and Solar Eclipse was on May 9, 1910, when the longitude of Moon was  $47^{\circ} 42'$ ,  $\text{D } \Delta \text{ } \Psi \text{ } r$ . Full Moon and Lunar Eclipse was on May 24, 1910, when the longitude of Moon was  $242^{\circ} 10'$ ,  $\text{D } \Delta \text{ } \text{Asc. } r$ .

*Problem 61*—Find all the transits over the radicals, relative to October 22, 1910, in George V's nativity

The range of the current positions of bodies from midnight to midnight on October 22, 1910, and their transits of houses were as follows —

		Transits		Transits
$\text{D}$	$75^{\circ} 13'$ to $89^{\circ} 42'$	III	$\Psi$	$205^{\circ} 33'$ to $205^{\circ} 46'$ VII
$\text{O}$	$207^{\circ} 43'$ to $208^{\circ} 42'$	VII	$\Delta$	$33^{\circ} 32'$ to $33^{\circ} 27'$ I
$\Psi$	$193^{\circ} 48'$ to $195^{\circ} 25'$	VII	$\text{H}$	$291^{\circ} 27'$ XI
$\text{r}$	$198^{\circ} 48'$ to $200^{\circ} 3'$	VII	$\text{v}$	$111^{\circ} 34'$ IV
$\text{r}$	$199^{\circ} 39'$ to $200^{\circ} 18'$	VII		

On comparing these current positions with the aspect positions in Schedule XXI, we find the following transits over bodies —

$\text{D } \Delta \text{ } \text{h } r$	$\text{O } \Delta \text{ } \text{H } r$	$\text{v}$
$\text{D } \text{r } \Psi \text{ } r$	$\text{r } \Delta \text{ } \text{O } r$	
$\text{D } \text{r } \text{H } r$	$\Psi \text{ } \Delta \text{ } \text{h } r$	
$\text{D } \text{r } \text{M.C. } r$	$\text{h } \square \text{ } \text{r } r$	

New Moon was on October 3, 1910, when the longitude of Moon was  $189^{\circ} 15'$ ,  $\text{D } \text{r } \Psi \text{ } r$ . Full Moon was on October 18, 1910, when the longitude of Moon was,  $24^{\circ} 20'$ ,  $\text{D } \text{r } \text{h } r$ .

Now let us take the progressed bodies and their aspects on the three dates

- (i) July 6, 1893—the previous birth date was June 3, 1893. Progressed date July 1, 1865. The equivalent moment of birth on July 1, 1865, was 1 23 a.m. G.M.T.

The positions and their aspects at 1 23 a.m. G.M.T. on July 1, 1865, were as follows —

	Conjunction	Square	Trine	Opposition
$\Psi$	$10^{\circ} 34'$	$100^{\circ} 34'$ $280^{\circ} 34'$	$130^{\circ} 34'$ $250^{\circ} 34'$	$190^{\circ} 34'$
$\text{r}$	$54^{\circ} 41'$	$144^{\circ} 41'$ $324^{\circ} 41'$	$174^{\circ} 41'$ $294^{\circ} 41'$	$234^{\circ} 41'$
Asc	$59^{\circ} 6'$	$149^{\circ} 6'$ $329^{\circ} 6'$	$179^{\circ} 6'$ $299^{\circ} 6'$	$239^{\circ} 6'$

	Conjunction	Square	Trine	Opposition
☿	90° 18'	180° 18' 0 18	210° 18' 330 18	270° 18'
♀	98 12	188 12 8 12	218 12 338 12	278 12
☾	99 10	189 10 9 10	219 10 339 10	279 10
♂	142 17	232 17 52 17	262 17 22 17	322 17
♂	189 1	279 1 99 1	309 1 69 1	9 1
♂	203 37	293 37 113 37	323 37 83 37	23 37
♂	262 10	352 10 172 10	22 10 142 10	82 10
M.C.	297 47	27 47 207 47	57 47 177 47	117 47

Now arranging these positions in their numerically increasing order,  
we get the following schedule —

**Schedule XXII—The Progressed bodies and Aspects for the 29th year**

Progressed position	Aspect	Progressed position	Aspect
0° 18	☿ ☿	82° 10	♂ ♀
8 12	☿ ♀	83 37	♂ ♂
9 1	♂ ☾	90 18	♂ ☿
9 10	☿ ☾	98 12	♂ ♀
10 34	♂ ♀	99 1	☿ ☾
22 10	♂ ♀	99 10	♂ ☾
27 17	♂ ☿	103 34	☿ ☿
23 37	♂ ♂	113 37	☿ ♂
27 47	☿ M.C.	117 47	♂ M.C.
52 17	☿ ♂	130 34	♂ ☿
54 41	♂ ♀	142 17	♂ ♀
57 47	♂ M.C.	142 10	♂ ♂
59 6	♂ Asc.	144 41	☿ ♀
69 1	♂ ☾	149 6	☿ Asc.

**Schedule XXII—The Progressed Bodies and Aspects for the  
29th year—(Contd.)**

Progressed position	Aspect	Progressed position	Aspect
188° 12'	□ ♀	262° 17'	△ ♀
189° 1	♂ ♀	270 18	♂ ♀
189 10	□ ○	278 12	♂ ♀
190 34	♂ ♀	279 1	□ ♀
203 37	♂ ♀	279 10	♂ ○
207 47	□ M.C.	280 34	□ ♀
210 18	△ ♀	293 37	□ ♀
218 12	△ ♀	294 41	△ ♀
219 10	△ ○	297 47	♂ M.C.
232 17	□ ♂	299 6	△ Asc.
234 41	△ ♀	309 1	△ ♀
239 6	♂ Asc.	322 17	♂ ♂
250 34	△ ♀	323 37	△ ♀
262 10	♂ ♀	324 41	□ ♀
172 10	□ ♀	329 6	□ Asc.
174 41	△ ♀	330 18	△ ♀
177 47	△ M.C.	338 12	△ ♀ ♂
179 6	△ Asc.	339 10	△ ○
180 18	□ ♀	352 10	□ ♀

**Problem 62—Find all the Transits over the progressed bodies, relative to July 6, 1893, in George V's nativity.**

The range of the current positions of bodies, from midnight to midnight, on July 6, 1893, (see Problem 59) and the transits of houses were as follows:—

Transits				Transits			
♂	2° 35'	to	16° 6'	XII	♂	53° 17'	to 53° 30'
○	104 6	to	105 3	III	♂	186 40	to 186 42
♀	129 52	to	131 3	IV	♂	216 39	
♀	121 31	to	122 44	IV	♀	72 15	to 72 17
♂	123 42	to	124 19	IV			

On comparing the current positions with the aspect positions in Schedule XXII, we find the following transits over progressed bodies:—

♂ □ ♀ ♀	♂ □ ♂ ♀
♂ ♂ ♀ ♀	♂ □ ♀ ♀
♂ □ ○ ♀	♂ △ ♀ ♀
♂ ♂ ♀ ♀	♂ △ ♀ ♀
♀ △ ♀ ♀	

For New and Full Moons see under Problem 59.

- (ii) May 6, 1910—the previous birth-date was June 3, 1909. The Progressed date was July 17, 1865, and the equivalent moment of birth was 1-26 a.m. G.M.T.

The positions and their aspects at 1-26 a.m. G.M.T. on July 17, 1865 were as follows:—

	<i>Conjunction</i>	<i>Square</i>	<i>Trine</i>	<i>Opposition</i>
♈	10° 35'	100° 35' 280 35	130° 35' 250 35	190° 35'
♉	42 24	132 24 312 24	162 24 282 24	222 24
♊	68 48	158 48 338 48	188 48 308 48	248 48
Asc.	79 25	169 25 349 25	199 25 319 25	259 25
♋	91 18	181 18 1 18	211 18 331 18	271 18
♌	114 25	204 25 24 25	234 25 354 25	294 25
♍	130 34	220 34 40 34	250 34 10 34	310 34
♎	152 6	242 6 62 6	272 6 32 6	332 6
♏	203 55	293 55 113 55	323 55 83 55	23 55
♐	260 32	350 32 170 32	20 32 140 32	80 32
M.C.	313 55	43 55 223 55	73 55 193 55	133 55

Now arranging these positions in their increasing numerical order, we get the following schedule:—

## Schedule XXIII—The Progressed bodies and aspects for the 45th year

Progressed position	Aspect	Progressed position	Aspect
1° 18'	□ H	193° 55'	△ M.C.
10 34	△ ♄	199 25	△ Asc.
10 35	♄ ♀	203 55	♄ ♄
20 32	△ ♀	204 25	□ ○
23 55	♄ ♄	211 18	△ ♀
24 25	□ ○	220 34	□ ♄
32 6	△ ♄	222 24	♄ ♄
40 34	□ ♄	223 55	□ M.C.
42 24	♄ ♄	234 25	△ ○
53 55	□ M.C.	242 6	□ ♄
62 6	□ ♄	248 48	♄ ♄
68 48	♄ ♄	250 34	△ ♄
73 55	△ M.C.	250 35	△ ♀
79 25	♄ Asc.	259 25	♄ Asc.
80° 32'	♄ ♀	260 32	♄ ♀
83 55	△ ♄	271 18	♄ ♀
91 18	♄ ♀	272 6	△ ♄
100 35	□ ♀	280 35	□ ♀
113 55	□ ♄	282 24	△ ♄
114 25	♄ ○	293 55	□ ♄
130 34	♄ ♄	294 25	♄ ○
130 35	△ ♀	308 48	△ ♄
132 24	□ ♄	310 34	♄ ♄
133 55	♄ M.C.	312 24	□ ♄
140 32	△ ♀	313 55	♄ M.C.
152 6	♄ ♄	319 25	△ A.C.
158 48	□ ♄	323 55	△ ♄
162 24	△ ♄	331 18	△ ♀
169 25	□ Asc.	332 6	♄ ♄
170 32	□ ♀	338 48	□ ♄
181 18	□ ♀	349 25	□ Asc.
188 48	△ ♄	350 32	□ ♀
190 35	♄ ♀	354 25	△ ○

Problem 63—Find all Transits over Progressed bodies, relative to May 6, 1910, in George V's nativity

The range of the current positions of bodies from midnight to midnight on May 6, 1910 (Problem 60) and Transits over houses were as follows —

Transits		Transits	
♂	359° 12' to 14° 0' ♌ Prog.	♂	185° 41' to 185° 36' ♊ Prog.
♂	44 35 to 45 33 ♌II	♂	28 38 to 28 46 XII
♂	64 53 to 65 32 XII	♂	295 13 IX
♂	358 52 to 359 54 ♌I	♂	106 57 II
♂	92 34 to 93 11 I		

On comparing these current positions with the aspect positions in Schedule XXIII we find the following transits over bodies —

♂ □ ♀ ♀	♂ □ MC ♀
♂ △ ♀ ♀	♂ ♀ ♀ ♀
♂ ♀ ♀ ♀	♂ ♀ ♀ ♀

For New and Full Moons see under Problem 60

(iii) October 22, 1910—The previous birth date was June 3, 1910 The Progressed date was July 18, 1865, and the equivalent moment of birth was 1 26 a.m. G M T.

The positions and aspects at 1 26 a.m. G M T, on July 18, 1865, were as follows —

	Conjunction	Square	Trine	Opposition
♂	10° 35'	100° 35'	130° 35'	190° 35'
		280 35	250 35	
♂	56 19	146 19	176 19	236 19
		326 19	296 19	
♂	69 45	159 45	189 45	249 45
		339 45	309 45	
Asc.	80 26	170 26	200 26	260 26
		350 26	320 26	
♂	91 21	181 21	211 21	271 21
		1 21	331 21	
♂	115 22	205 22	235 22	295 22
		25 22	355 22	
♂	132 20	222 20	252 20	312 20
		42 20	12 20	
♂	152 43	242 43	272 43	332 43
		62 43	32 43	
♂	203 56	293 56	323 56	23 56
		113 56	83 56	
♂	260 27	350 27	20 27	80 27
		170 27	140 27	
M.C.	314 54	44 54	74 54	134 54
		224 54	194 54	



Now arranging these positions in their increasing numerical order,  
we get the following schedule:—

Schedule XXIV—The Progressed bodies and their aspects for the 46th year.

Progressed position	Aspect	Progressed position	Aspect
1° 21'	□ ♀	194° 54'	△ M.C.
10 35	♄ ♀	200 26	♄ Asc.
12 20	△ ♀	203 56	♄ ♀
20 27	△ ♀	205 22	□ ☉
23 56	♄ ♀	211 21	△ ♀
25 22	□ ☉	222 20	□ ♀
32 43	△ ♀	224 54	□ M.C.
42 20	□ ♀	235 22	△ ☉
44 54	□ M.C.	236 19	♄ ☉
56 19	♄ ☉	242 43	□ ♀
62 43	□ ♀	249 45	♄ ♀
69 45	♄ ♀	250 35	△ ♀
74 54	△ M.C.	252 20	△ ♀
80 26	♄ Asc.	260 26	♄ Asc.
80 27	♄ ♀	260 27	♄ ♀
83 56	△ ♀	271 21	♄ ♀
91 21	♄ ♀	272 43	△ ♀
100 35	□ ♀	280 35	□ ♀
113 56	□ ♀	293 56	□ ♀
115 22	♄ ☉	295 22	♄ ☉
130 35	△ ♀	296 19	△ ☉
132 20	♄ ♀	309 45	△ ♀
134 54	♄ M.C.	312 20	♄ ♀
140 27	△ ♀	314 54	♄ M.C.
146 19	□ ☉	320 26	△ Asc.
152 43	♄ ♀	325 56	△ ♀
159 45	□ ♀	326 19	□ ☉
170 26	□ Asc.	331 21	△ ♀
170 27	□ ♀	332 43	♄ ♀
176 19	△ ☉	339 45	□ ♀
181 21	□ ♀	350 26	□ Asc.
189 45	△ ♀	350 27	□ ♀
190 35	♄ ♀	355 22	△ ☉

Problem 64—Find all the Transits over progressed bodies, relative to October 22, 1910 in George V's nativity.

The range of the current positions of bodies from mid night to mid night on October 22, 1910 (Problem 61) and Transits our houses were as follows —

Transits				Transits	
D	75° 13' to 89° 42'	XII & I Prog.	♈	205° 33' to 205° 46'	V Prog.
O	207 43 to 208 42	V	♏	33 32 to 33 27	XII
♈	193 48 to 195 25	V	♏	291 27	VIII
♏	198 48 to 200 3	V	♏	111 34	II
♏	199 39 to 200 18	V			

On comparing the current positions with the aspect positions in Schedule XXIV, we find the following transits our bodies.

D Δ MC p	♏ Δ Asc p
D ♏ Asc p	♏ Δ Asc p
D ♏ ♈ p	♏ □ O p
D Δ ♏ p	♏ Δ ♏ p
♏ Δ MC p	

For New and Full Moons see under Problem 61.

## Schedule XXV—Recapitulation of the characteristic features of each class of Directions and Aspects.

Directions or Aspects	The Moment for Casting the horoscope	Nature of Aspects	Bodies in Aspect	When Directions or Aspects bear fruit	Is there an arc of direction?	Is there an orb?
Radical Aspects	The moment of birth	Zod. & Mund.	Radicals	Whole life	No	Yes
Primary Direction	The moment of birth	Mundane (and Zodiacal)	Radicals and bodies soon after birth	During the year measured to by the arc of direction	Yes	No
Secondary Direction	The equivalent moment of birth on the same ordinal date subsequent to birth as the ordinal number of year of life	Zodiacal	Progressed bodies at the moment and Radicals or other Progressed bodies at the moment	During the ordinal year corresponding to the ordinal number of day from birth on the Progressed date	Yes	No
Synodic Lunation	The moment when Moon was at the same distance from the Sun as at birth for the same number of time as the ordinal number of year of life containing the given date	Zodiacal	Bodies at the moment	During the ordinal year of life corresponding to the ordinal number of the lunation from birth	No	Yes
Solar Return	The moment just before the given date when the Sun was at the same longitude as at birth	Zodiacal	Bodies at the moment	During the whole year succeeding the moment	No	Yes
Current Synodic Lunation	The moment just before the given date when Moon was at the same distance from the Sun as at birth	Zodiacal	Bodies at the moment	During the whole synodic month succeeding the moment	No	No
Lunar Return	The moment just before the given date when Moon was at the same longitude as at birth	Zodiacal	Bodies at the moment	During the whole lunar month succeeding the moment	No	No
Daily Map	The equivalent moment of birth on the given date	Zodiacal	Bodies at the moment	During the whole day	No	No
Transit	The Greenwich mean midnights both at the beginning and at the end of the given period	Zodiacal	Radicals or Progressed, and Bodies during the period	During the period of Transit	No	Yes

**89. Comparative Study of Aspects and Directions**—Let us take the three most important dates in George V's life, namely, July 6, 1893, May 6, 1910 and October 22, 1910, and see what are the several aspects, directions and transits that have had a bearing on his life on the dates. We have to note the aspects, directions and transits relative to these different dates under the following heads —

- (i) All the Radical Zodiacal Aspects
- (ii) All the Radical Mundane Aspects.
- (iii) All the Primary Mundane Directions relative to the 29th, the 45th and the 46th year.
- (iv) All the Secondary directions of the progressed to the radicals, and of the progressed to the other progressed bodies, relative to the three years.
- (v) The Epochal Aspects at the Solar Returns at the beginnings of the three years.
- (vi) All Transits over the radicals and the progressed bodies during the three days.

Though the arcs of primary mundane directions are strictly speaking only about  $28^{\circ} 5'$ ,  $44^{\circ} 55'$  and  $45^{\circ} 20'$ , yet we shall take into consideration also directions whose arcs are half of a degree more or less. In the case of secondary directions we shall take directions whose arcs measure to six months before and after the dates

## Radical Aspects in George V's nativity

Zodiacal	Mundane
♂ S ☐ ♀	♂ A ☐ ♀
S ☐ ♀	S ☐ ♀
A ♄ ♀	S ♀ ♀
A ♄ ♀	S ♄ ♀
A ☐ ♀	A ♄ ♀
♂   ♀	A ☐ ☐
	A   ♀
♀ A ♄ ♀	♀ A ♄ ♀
S   ♀	S * ♀
	A ☐ ♀
♀ A ♄ ♀	A ♀ ♀
A ☐ ♀	♀ S ♀ ♀
	A * ♀
☐ S * ♀	S ☐ ♀
A ☐ ♀	☐ A * ♀
S ♄ ♀	A ☐ ♀
S * ♀	S ♄ ♀
A   ♀	S ♄ ♀
A   ♀	S ☐ ♀
♂ A ☐ ♀	♂ S ☐ ♀
A ☐ ♀	A ☐ ♀
A    ☐	S * ♀
	A * ♀
♂ A * ♀	S ☐ ♀
S ♀ ♀	A ☐ ♀
A    ♀	♂ A * ♀
	S ♀ ♀
♀ S ☐ ♀	♀ S ☐ ♀





Directions, Aspects and Transits relative to October 22, 1910, in George V's nativity, i. e., to the 46th year

Primary Directions			Secondary Directions		Aspects at the		Transits		New Moons Full Moons & Eclipses
Mandane	To the Rad	cals	To the Progressed	Solar Return	Over the Rad	Over the Prog.			
♂ Q 45° 51'	♂ ♄ Aug 10	♂ ♄ Sep 10	♂ ♄ Sep 10	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	New Moon, October 3, 1910, with Moon at 189° 15', and ♂ ♄ ♄
♂ Q 45 28	♂ ♄ Sep 10	♂ ♄ Oct 10	♂ ♄ Oct 10	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	Full Moon, October 18, 1910, with Moon at 24° 20', and ♂ ♄ ♄
♂ Q 45 50	♂ ♄ Sep 10	♂ ♄ Oct 10	♂ ♄ Oct 10	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	
♂ Q 45 9	♂ ♄ Oct 10	♂ ♄ Nov 10	♂ ♄ Nov 10	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	
♂ Q 45 26	♂ ♄ Nov 10	♂ ♄ Nov 10	♂ ♄ Nov 10	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	
♂ Q 45 48	♂ ♄ Nov 10	♂ ♄ Nov 10	♂ ♄ Nov 10	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	♂ ♄ ♄	

End



# ANSWERS

## LESSON I [Pages 1 to 10]

### Ex. 1 [Page 1]

	Long.			Lat.
O	260° 43' 23"	...	...	0° 0' 0"
P	274 30 13	...	...	1 10 11 S
Q	280 42	...	...	2 5 S
R	214 3	...	...	2 39 N
S	297 22	...	...	1 15 S
T	118 47	...	...	0 21 N
U	279 47	...	...	0 26 N
V	120 42	...	...	0 35 N
W	21 22	...	...	1 35 S

### Ex. 2 [Page 2]

X	213° 52' 1"
XI	242 3' 8"
XII	267 58' 9"
I	294 34' 2"
II	327 30' 0"
III	1 49' 8"

### Ex. 4 [Page 3]

#### Mundane Position

	By M. D.			By C. D. F.
a	91° L 55' 2"	...	...	I 3° 24' 4"
b	11 L 12' 9"	...	...	III 18 15' 9"
c	90 U 37' 0"	...	...	VII 4 23' 9"
d	88 U 34' 6"	...	...	VII 6 23' 4"
e	1 U 5' 4"	...	...	X 1 5' 4"
f	48 U 16' 8"	...	...	XI 20 9' 9"
g	63 U 19' 6"	...	...	XII 7 19' 8"
h	68 U 59' 0"	...	...	XII 12 40' 0"
i	70 U 11' 2"	...	...	XII 14 19' 1"

Ex 6 [Page 3]									
Body.	C. Long	C. Lat.	R. A.	Decl	M. D.	S A.	H S.	H. D.	C. D.
♈	297° 22'	1 S 15	299° 42'	21 S 56	91 L 55'2	95 N 19'5	31 N 46'5	3 L 24'4	i 3 F 24'4 ii 28 B 22'1
♉	21 22	1 S 35	20 25	6 N 44	11 L 12'9	88 N 26'3	29 N 28'8	77 L 13'5	iii 18 F 15'9 iv 11 B 12'9
♊	118 47	0 N 21	121 0	20 N 45	90 U 37'0	95 D 0'8	31 D 40'3	4 W 23'9	vii 4 F 23'9 viii 27 B 16'4
♋	120 42	0 N 35	123 3	20 N 35	88 U 34'6	94 D 38'0	31 D 39'3	6 W 23'4	vii 6 F 23'4 viii 25 B 15'9
♌	214 3	2 N 39	212 43	10 S 22	1 U 5'4	87 D 35'0	29 D 11'7	88 W 40'4	x 1 F 5'4 xi 28 B 6'3
♍	260 43	0 0	259 54	23 S 8	48 U 16'8	84 D 20'9	28 D 7'0	132 W 37'7	xi 20 F 9'9 xii 7 B 57'1
♎	274 30	1 S 10	274 57	24 S 33	63 U 19'6	83 D 57'2	27 D 59'1	147 W 15'1	xii 7 F 19'8 i 20 B 39'3
♏	279 47	0 N 26	280 36	22 S 40	68 U 59'0	84 D 28'5	28 D 9'5	153 W 27'6	xii 12 F 40'0 i 15 B 29'5
♐	280 42	2 S 5	281 49	25 S 6	70 U 11'2	83 D 48'1	27 D 56'0	153 W 59'3	xii 14 F 19'1 i 13 B 36'9
M.C.	213 52	0 0	211 37	12 S 49	—	—	—	—	—
Asc.	294 34	0 0	296 29	21 S 13	—	—	—	—	—

Ex 7 [Page 5]									
♈	♈	♈	♈	♈	♈	♈	♈	♈	♈
♉	♉	♉	♉	♉	♉	♉	♉	♉	♉
♊	♊	♊	♊	♊	♊	♊	♊	♊	♊
♋	♋	♋	♋	♋	♋	♋	♋	♋	♋
♌	♌	♌	♌	♌	♌	♌	♌	♌	♌
♍	♍	♍	♍	♍	♍	♍	♍	♍	♍
♎	♎	♎	♎	♎	♎	♎	♎	♎	♎
♏	♏	♏	♏	♏	♏	♏	♏	♏	♏
♐	♐	♐	♐	♐	♐	♐	♐	♐	♐
♑	♑	♑	♑	♑	♑	♑	♑	♑	♑
♒	♒	♒	♒	♒	♒	♒	♒	♒	♒
♓	♓	♓	♓	♓	♓	♓	♓	♓	♓

Ex 8 [Page 5]									
♈	♈	♈	♈	♈	♈	♈	♈	♈	♈
♉	♉	♉	♉	♉	♉	♉	♉	♉	♉
♊	♊	♊	♊	♊	♊	♊	♊	♊	♊
♋	♋	♋	♋	♋	♋	♋	♋	♋	♋
♌	♌	♌	♌	♌	♌	♌	♌	♌	♌
♍	♍	♍	♍	♍	♍	♍	♍	♍	♍
♎	♎	♎	♎	♎	♎	♎	♎	♎	♎
♏	♏	♏	♏	♏	♏	♏	♏	♏	♏
♐	♐	♐	♐	♐	♐	♐	♐	♐	♐
♑	♑	♑	♑	♑	♑	♑	♑	♑	♑
♒	♒	♒	♒	♒	♒	♒	♒	♒	♒
♓	♓	♓	♓	♓	♓	♓	♓	♓	♓

No Parallels



From	To MC	°	′	″	°	′	″	Asc.	°	′	″	°	′	″
°	0 1° 5′	0 0°	0′	1 49° 51′	11 6° 33	11 12° 3′	11 13° 53′	11 28° 7′	11 28° 2′	17° 0′	11 26° 15′	11 25° 25′		
○	1 20 10	1 19 7	0 0 0	0 16 19	0 20 36	0 22 22	1 7 57	1 10 58	111 25 22	iv 16 16	iv 14 26			
▷	11 7 20	11 6 17	0 15 15	0 0 0	0 8 18	0 7 1	0 20 39	0 28 39	111 10 1	v 3 27	v 1 41			
◁	11 12 40	11 11 37	0 20 38	0 5 18	0 0 0	0 1 46	0 15 30	0 18 31	111 4 57	v 8 45	v 6 59			
⋈	11 14 19	11 13 17	0 22 13	0 7 0	0 1 45	0 0 0	0 13 37	0 16 37	111 2 59	v 10 26	v 8 41			
♈	11 3 24	11 2 13	1 12 24	0 26 52	0 20 53	0 18 54	0 3 24	0 0 0	11 16 17	v 30 46	v 28 46			
♉	11 18 16	11 17 10	11 26 36	11 10 33	11 5 0	11 3 9	11 18 16	11 15 0	0 0 0	111 15 19	111 17 10			
♊	11 27 16	11 26 27	iv 18 19	v 3 53	v 9 51	v 11 50	v 27 16	v 30 40	111 16 27	0 0 0	0 0 0			
♋	11 25 16	11 26 27	iv 16 19	v 1 54	v 7 51	v 9 50	v 25 16	v 28 40	111 18 26	0 2 0	0 0 0			

NB—Figures in thick types are those obtained by rectification.

Diur. A. E. $\alpha$	Diff	Aspect	Noct. A. E. $\alpha$	Diff
0 0		$\delta$	0 0	
i 0 0	31 40'3	$\gamma$	i 0 0	28 19'7
6 20'1	6 20'1	$\perp$	5 39'9	5 39'9
15 50'2	9 30'1	$\angle$	8 29'9	8 29'9
ii 0 0	15 50'1	$\ast$	14 9'8	14 9'9
12 40'1	12 40'1	$\circ$	11 19'9	11 19'9
19 0'1	19 0'1	$\square$	16 59'9	16 59'9
iii 0 0	31 40'3	$\square$	iii 0 0	28 19'7
iv 0 0	15 50'1	$\Delta$	iv 0 0	14 9'9
15 50'1	9 30'1	$\square$	14 9'9	8 29'9
25 20'2	6 20'0	$\pm$	22 39'8	5 40'0
v 0 0	31 40'3	$\pi$	v 0 0	28 19'7
vi 0 0		$\epsilon$	vi 0 0	

Diur. A. E. $\beta$	Diff	Aspect	Noct. A. E. $\beta$	Diff
0 0		$\delta$	0 0	
i 0 0	31 39'3	$\gamma$	i 0 0	28 20'7
6 19'9	6 19'9	$\perp$	5 40'1	5 40'1
15 49'7	9 29'8	$\angle$	8 30'2	8 30'2
ii 0 0	15 49'7	$\ast$	14 10'3	14 10'3
12 39'7	12 39'7	$\circ$	11 20'3	11 20'3
18 59'6	18 59'6	$\square$	17 0'4	17 0'4
iii 0 0	31 39'3	$\square$	iii 0 0	28 20'7
iv 0 0	15 49'7	$\Delta$	iv 0 0	14 10'3
15 49'7	9 29'8	$\square$	14 10'3	8 30'2
25 19'5	6 19'9	$\pm$	22 40'5	5 40'1
v 0 0	31 39'3	$\pi$	v 0 0	28 20'7
vi 0 0		$\epsilon$	vi 0 0	

Diur. A. E. d	Diff	Aspect	Noct. A. E. d	Diff
0 0		d	0 0	
i 0 0	27 59.1	u	i 0 0	32 0.9
5 35.8	5 35.2	l	6 24.2	6 24.2
13 59.5	8 23.7	z	9 36.3	9 36.3
13 59.6	13 59.6	z	16 0.5	16 0.4
ii 0 0	11 11.6	*	ii 0 0	12 48.4
11 11.6	16 47.4	Q	12 48.4	19 12.6
iii 0 0	27 59.1	□	iii 0 0	32 0.9
iv 0 0	13 59.6	Δ	iv 0 0	16 0.4
13 59.6	8 23.7	□	16 0.4	9 36.3
22 23.3	5 35.8	±	25 36.7	6 24.2
v 0 0	27 59.1	π	v 0 0	32 0.9
vi 0 0		ρ	vi 0 0	

Diur. A. E. h	Diff	Aspect	Noct. A. E. h	Diff
0 0		d	0 0	
i 0 0	28 9.5	u	i 0 0	31 50.5
5 37.9	5 37.9	l	6 22.1	6 22.1
14 4.8	8 26.9	z	9 33.1	9 33.1
14 4.7	14 4.7	z	15 55.2	15 55.3
ii 0 0	11 15.8	*	ii 0 0	12 44.2
11 15.8	16 53.7	Q	12 44.2	19 6.3
iii 0 0	28 9.5	□	iii 0 0	31 50.5
iv 0 0	14 4.7	Δ	iv 0 0	15 55.3
14 4.7	8 26.9	□	15 55.3	9 33.1
22 31.6	5 37.9	±	25 28.4	6 22.1
v 0 0	28 9.5	π	v 0 0	31 50.5
vi 0 0		ρ	vi 0 0	

Diur. A. E. r	Diff	Aspect	Noct. A. E. r	Diff
0 0			0 0	
i 0 0	27 56'0	♄	i 0 0	32 4'0
5 35'2	5 35'2	♌	6 24'8	6 24'8
13 58'0	8 22'8	♍	16 20	9 37'2
ii 0 0	13 58'0	♎	ii 0 0	16 20
11 10'4	11 10'4	♏	12 49'6	12 49'6
iii 0 0	16 45'6	♐	iii 0 0	19 14'4
iv 0 0	27 56'0	♑	iv 0 0	32 4'0
13 58'0	13 58'0	♒	16 20	16 20
8 22'8	8 22'8	♓	9 37'2	9 37'2
22 20'8	5 35'2	♈	25 39'2	6 24'8
v 0 0	27 56'0	♉	v 0 0	32 4'0
vi 0 0		♊	vi 0 0	

## Ex. 12 [Page 29]

z	Sets	4° 23'9	W.H.D.	Sets	185° 37'8	E.H.D.
♈	"	6 23'4	"	"	183 32'5	"
♉	"	88 40'4	"	"	86 29'6	"
♊	"	132 37'7	"	"	36 4'1	"
♋	"	147 15'1	"	"	20 39'3	"
♌	"	153 27'6	"	"	15 29'5	"
♍	"	153 59'3	"	"	13 36'9	"
♎	Rises	3 24'4	E.H.D.	Rises	187 14'6	W.H.D.
♏	"	77 13'5	"	"	99 39'2	"

## Ex. 13 [Page 29]

z	0'04843	⊙	9'94538	z	5'94009
♈	0'04798	♈	9'94155	♈	0'05145
♉	9'97667	♉	9'94561	♉	9'98493

In all the solutions of Exercises 14 to 59, a life of span of 75 years only has been adopted.

## Ex. 14 [Page 29]

♂ □ M.C. 3° 24'4	ψ π M.C. 18° 15'9	♂ □ M.C. 4° 23'9
Q 70 20'5	± 24 9'7	Δ 32 43'6
* 31 37'9	□ 33 0'3	□ 46 53'5
∠ 45 44'7	Δ 47 44'7	± 55 23'4
⊥ 54 12'7		π 61 3'3
⋈ 59 51'4		
♂ □ M.C. 6° 23'4	† δ M.C. 1° 5'4	○ ∠ M.C. 6° 6'4
Δ 34 44'1	⋈ 30 17'1	⊥ 14 32'6
□ 48 54'4	⊥ 36 7'4	⋈ 20 9'9
± 57 24'7	∠ 44 52'9	δ 48 16'9
π 63 4'8	* 59 28'7	
♂ * M.C. 7° 19'8	♂ Q M.C. 1° 24'2	† Q M.C. 3° 8'7
∠ 21 19'4	* 12 40'0	* 14 19'1
⊥ 29 43'1	⋈ 26 44'7	∠ 28 17'1
⋈ 35 18'9	⊥ 35 11'6	⊥ 36 39'9
δ 63 18'0	⋈ 40 49'5	⋈ 42 15'1
	δ 68 59'0	δ 70 11'1

## Ex. 15 [Page 29]

♂ δ Asc. 3° 24'4	ψ Q Asc. 6° 28'3	♂ δ Asc. 4° 23'9
⋈ 31 37'9	* 18 15'9	π 32 43'6
⊥ 37 16'6	∠ 33 0'3	± 38 23'5
∠ 45 44'7	⊥ 41 50'9	□ 46 53'4
* 59 51'4	⋈ 47 44'7	Δ 61 3'3
Q 71 8'8		
♂ δ Asc. 6° 23'4	† □ Asc. 1° 5'4	○ ∠ Asc. 6° 6'4
π 34 44'1	Δ 30 17'1	* 20 9'8
± 40 24'2	□ 44 52'9	Q 31 24'8
□ 48 54'4	± 53 38'4	□ 48 16'7
Δ 63 4'8	π 59 28'7	
♂ ⋈ Asc. 7° 19'8	♂ ⋈ Asc. 12° 40'0	† ⋈ Asc. 14° 19'1
⊥ 12 55'6	⊥ 18 17'9	⊥ 19 54'3
∠ 21 19'3	∠ 26 44'8	∠ 28 17'1
* 35 18'8	* 40 49'5	* 42 15'1
Q 46 30'5	Q 52 5'3	Q 53 25'5
□ 63 18'0	□ 68 59'0	□ 70 11'1



## Ex. 16 [Page 29]

$\angle \propto \angle$	28° 36'4	$\angle \angle \angle$	17° 9'9	$\angle \angle \angle$	18° 56'1
$\perp$	34 15'1	$\propto$	45 23'4	$\propto$	47 9'6
$\angle$	42 43'2	$\perp$	51 2'1	$\perp$	52 48'3
$*$	56 49'9	$\angle$	59 30'1	$\angle$	61 16'3
$Q$	68 7'3	$*$	73 36'9		
$\angle \angle \angle$	24° 14'4	$\angle \perp \odot$	5° 44'7	$\angle \square \angle$	2° 13'3
$\propto$	52 27'9	$\propto$	11 23'4	$Q$	19 17'4
$\perp$	58 6'6	$\angle$	39 36'9	$*$	30 34'8
$\angle$	66 34'6	$\propto$	67 50'4	$\angle$	44 41'6
		$\perp$	73 29'1	$\perp$	53 9'6
				$\propto$	58 48'3
$\angle \propto \angle$	25° 56'0	$\angle \propto \angle$	27° 42'8	$\angle \square \angle$	14° 8'7
$\pm$	31 34'7	$\pm$	33 21'5	$\Delta$	42 22'2
$Q$	40 2'8	$Q$	41 49'6	$Q$	56 28'9
$\Delta$	54 9'5	$\Delta$	55 56'3	$\pm$	64 57'0
				$\propto$	70 35'7

## Ex. 17 [Page 29]

$\angle \propto \angle$	29° 28'8	$\angle Q \angle$	3° 18'6	$\angle \square \angle$	3° 9'2
$\perp$	35 22'6	$*$	15 6'2	$Q$	20 50'4
$\angle$	44 13'1	$\angle$	29 50'6	$*$	32 38'0
$*$	58 57'5	$\perp$	38 41'1	$\angle$	47 22'4
$Q$	70 45'1	$\propto$	44 34'9	$\perp$	56 12'9
		$\angle$	74 3'7	$\propto$	62 6'7
$\angle \square \angle$	5° 0'2	$\angle \square \angle$	10° 32'6	$\angle \square \odot$	26° 36'1
$Q$	22 41'4	$Q$	28 13'8	$Q$	44 17'3
$*$	34 29'0	$*$	40 1'4	$*$	56 4'9
$\angle$	49 13'4	$\angle$	54 45'8	$\angle$	70 49'3
$\perp$	58 3'9	$\perp$	63 36'3		
$\propto$	63 57'7	$\propto$	69 30'1		
$\angle \propto \angle$	17° 9'9	$\angle \Delta \angle$	12° 18'8	$\angle \Delta \angle$	14° 10'2
$\pm$	23 3'7	$Q$	27 3'2	$Q$	28 54'6
$Q$	31 54'3	$\pm$	35 53'8	$\pm$	37 45'2
$\Delta$	46 38'7	$\propto$	41 47'6	$\propto$	43 49'0
		$\angle$	71 16'4	$\angle$	73 7'8

## Ex. 18 [Page 29]

$\angle$	$28^{\circ} 47' 6''$	$\angle$	$15^{\circ} 10' 5''$	$\angle$	$1^{\circ} 0' 1''$
$\perp$	$34 27' 5''$	$\angle$	$32 10' 4''$	$\perp$	$26 42' 0''$
$\angle$	$42 57' 4''$	$\perp$	$43 30' 3''$	$\perp$	$32 22' 0''$
$\perp$	$57 7' 3''$	$\perp$	$37 40' 2''$	$\perp$	$40 51' 9''$
$\angle$	$68 27' 2''$	$\perp$	$66 10' 1''$	$\perp$	$55 1' 8''$
		$\perp$	$71 50' 0''$		
$\angle$	$18^{\circ} 12' 4''$	$\angle$	$19^{\circ} 59' 1''$	$\angle$	$25^{\circ} 18' 5''$
$\perp$	$46 32' 1''$	$\perp$	$48 18' 8''$	$\perp$	$53 38' 2''$
$\perp$	$52 12' 1''$	$\perp$	$53 58' 8''$	$\perp$	$59 18' 2''$
$\perp$	$60 42' 2''$	$\perp$	$62 28' 7''$	$\perp$	$67 48' 1''$
$\perp$	$74 51' 9''$				
$\angle$	$60^{\circ} 44' 6''$	$\angle$	$3^{\circ} 12' 9''$	$\angle$	$27^{\circ} 0' 6''$
$\perp$	$12 24' 6''$	$\perp$	$31 40' 2''$	$\perp$	$32 40' 5''$
$\perp$	$40 44' 3''$	$\perp$	$45 50' 1''$	$\perp$	$41 10' 4''$
$\perp$	$69 4' 0''$	$\perp$	$54 20' 0''$	$\perp$	$55 20' 3''$
$\perp$	$74 44' 0''$	$\perp$	$60 0' 0''$	$\perp$	$66 40' 2''$

## Ex. 19 [Page 30]

$\angle$	$29^{\circ} 0' 7''$	$\angle$	$1^{\circ} 59' 7''$	$\angle$	$17^{\circ} 10' 4''$
$\perp$	$34 40' 8''$	$\perp$	$30 47' 9''$	$\perp$	$34 10' 8''$
$\perp$	$43 11' 0''$	$\perp$	$36 28' 0''$	$\perp$	$45 31' 1''$
$\perp$	$57 21' 3''$	$\perp$	$44 58' 2''$	$\perp$	$59 41' 4''$
$\perp$	$68 41' 6''$	$\perp$	$59 58' 5''$	$\perp$	$68 11' 6''$
		$\perp$	$70 28' 8''$	$\perp$	$73 51' 7''$
$\angle$	$2^{\circ} 59' 8''$	$\angle$	$20^{\circ} 12' 3''$	$\angle$	$21^{\circ} 59' 1''$
$\perp$	$31 41' 8''$	$\perp$	$48 33' 0''$	$\perp$	$50 19' 8''$
$\perp$	$37 21' 9''$	$\perp$	$54 13' 1''$	$\perp$	$55 59' 9''$
$\perp$	$45 52' 1''$	$\perp$	$62 43' 3''$	$\perp$	$64 30' 1''$
$\perp$	$60 2' 4''$				
$\angle$	$27^{\circ} 18' 7''$	$\angle$	$8^{\circ} 44' 3''$	$\angle$	$5^{\circ} 12' 6''$
$\perp$	$55 39' 4''$	$\perp$	$14 24' 4''$	$\perp$	$33 40' 7''$
$\perp$	$61 19' 9''$	$\perp$	$42 45' 1''$	$\perp$	$47 51' 1''$
$\perp$	$69 49' 7''$	$\perp$	$71 5' 8''$	$\perp$	$56 21' 2''$
				$\perp$	$62 1' 3''$

## Ex. 20 [Page 30]

☿ ♄ ☿	29° 11' 7	☿ ♀ ♄	12° 42' 8	☿ ♀ ♄	14° 33' 1
♄	35 2' 0	*	24 23' 5	*	26 13 8
♌	43 47 5	♌	38 59' 3	♌	40 49' 6
*	58 23 3	♄	47 44' 8	♄	49 35' 1
♀	70 4 0	♄	53 35' 1	♄	55 25' 4
☿ ♄ ♄	12° 11' 8	☿ ♀ ♄	27° 9' 3	☿ ♀ ♄	15° 19' 2
♄	41 23 5	♄	41 45' 1	♄	44 30 9
♄	47 13' 8	♄	50 30 6	♄	59 6' 7
♄	55 59' 3	♄	56 20 9	♄	67 52' 2
♄	70 33' 1	♄		♄	73 42 5
☿ ♀ ♄	17° 9' 1	☿ ♀ ♄	5° 7' 3	☿ ♀ ♄	9° 20' 8
♄	46 20 8	♄	22 38 3	♄	21 1' 5
♄	60 56 6	♄	51 50' 0	♄	38 32' 5
♄	69 42' 1	♄	66 25' 8	♄	67 44' 2

## Ex 21 [Page 30]

♄ ♄ ♄	28° 7' 0	♄ ♄ ♄	5° 3' 4	♄ ♄ ♄	0° 25' 8
♄	33 44 3	♄	13 29 5	♄	14 29' 3
♌	42 10 4	♄	19 6' 9	♄	42 36' 3
*	56 13 9	♄	47 13 9	♄	59 28 5
♀	67 28 7			*	70 43 3
♄ ♄ ♄	2° 12' 1	♄ ♄ ♄	2° 44' 7	♄ ♄ ♄	3° 5' 5
♄	16 15' 6	♄	16 48 2	*	17 9 0
♄	44 22 6	♄	25 14 3	♄	28 23 8
♄	61 14' 8	♄	30 51 6	♄	45 16' 0
*	72 29 6	♄	59 53 6	♄	73 23' 0
♄ ♄ ♄	5° 45' 1	♄ ♄ ♄	7° 31' 0	♄ ♄ ♄	12° 48' 0
♄	11 22 5	♄	13 8 3	♄	18 25 3
♌	19 48 6	♌	21 34 4	♌	26 51' 4
*	33 52 1	*	35 37 9	*	40 54 9
♀	46 6 9	♀	46 52 7	♀	52 9 7
♄	61 59 1	♄	63 44' 9	♄	69 1' 9

## Ex 22 [Page 30]

$\angle$	$1^{\circ} 51' 1''$	$\angle$	$15^{\circ} 14' 7''$	$\angle$	$6^{\circ} 17' 1''$
$\angle$	33 34 9	$\angle$	43 13 8	$\angle$	20 16 7
$\angle$	41 58 6	$\angle$	48 49 6	$\angle$	28 40 4
$\angle$	55 58 2	$\angle$	57 13 3	$\angle$	34 16 2
$\angle$	67 9 3	$\angle$	71 12 9	$\angle$	62 15 3
$\angle$	$1^{\circ} 40' 8''$	$\angle$	$3^{\circ} 26' 6''$	$\angle$	$17^{\circ} 58' 6''$
$\angle$	7 16 6	$\angle$	9 2 4	$\angle$	31 58 2
$\angle$	15 40 3	$\angle$	17 26 1	$\angle$	40 21 9
$\angle$	29 33 9	$\angle$	31 25 7	$\angle$	45 57 7
$\angle$	57 39 0	$\angle$	59 24 8	$\angle$	73 56 8
$\angle$	74 26 4				
$\angle$	$4^{\circ} 19' 8''$	$\angle$	$20^{\circ} 58' 2''$	$\angle$	$22^{\circ} 43' 6''$
$\angle$	9 55 6	$\angle$	26 34 0	$\angle$	28 19 4
$\angle$	18 19 3	$\angle$	34 27 7	$\angle$	36 43 1
$\angle$	32 18 9	$\angle$	48 57 3	$\angle$	50 42 7
$\angle$	43 30 6	$\angle$	60 9 0	$\angle$	61 54 4
$\angle$	60 18 0				

## Ex 23 [Page 30]

$\angle$	$28^{\circ} 9' 5''$	$\angle$	$5^{\circ} 17' 5''$	$\angle$	$20^{\circ} 37' 8''$
$\angle$	33 47 4	$\angle$	33 27 0	$\angle$	48 47 3
$\angle$	42 14 3	$\angle$	39 4 9	$\angle$	54 25 2
$\angle$	56 19 0	$\angle$	47 31 8	$\angle$	62 52 1
$\angle$	67 34 8	$\angle$	61 36 5		
		$\angle$	72 52 3		
$\angle$	$0^{\circ} 21' 2''$	$\angle$	$6^{\circ} 58' 9''$	$\angle$	$8^{\circ} 45' 4''$
$\angle$	11 37 0	$\angle$	12 36 8	$\angle$	14 23 3
$\angle$	25 41 7	$\angle$	21 3 7	$\angle$	22 50 2
$\angle$	34 8 6	$\angle$	35 8 4	$\angle$	36 54 9
$\angle$	39 46 5	$\angle$	63 17 9	$\angle$	65 4 4
$\angle$	67 56 0				
$\angle$	$23^{\circ} 22' 8''$	$\angle$	$9^{\circ} 38' 9''$	$\angle$	$26^{\circ} 23' 5''$
$\angle$	37 27 5	$\angle$	15 16 8	$\angle$	32 1 4
$\angle$	45 54 4	$\angle$	23 43 7	$\angle$	40 28 3
$\angle$	51 32 3	$\angle$	37 48 4	$\angle$	54 33 0
		$\angle$	49 4 2	$\angle$	65 48 8
		$\angle$	65 57 9		

## Ex 24 [Page 30]

$\angle$	$27^{\circ} 56' 0''$	$\angle$	$1^{\circ} 45' 2''$	$\angle$	$7^{\circ} 0' 2''$
$\perp$	33 31 2	$\perp$	29 41 2	$\perp$	34 56 2
$\angle$	41 54 0	$\angle$	35 16 4	$\angle$	40 31 4
$\ast$	55 52 0	$\angle$	43 39 2	$\angle$	48 54 2
$\Omega$	67 2 4	$\ast$	57 37 2	$\ast$	67 52 2
		$\Omega$	68 47 6	$\Omega$	74 2 6
$\angle$	$2^{\circ} 13' 1''$	$\angle$	$2^{\circ} 6' 2''$	$\angle$	$8^{\circ} 40' 8''$
$\perp$	50 9 1	$\ast$	13 16 6	$\perp$	14 16 0
$\angle$	55 44 3	$\angle$	27 14 6	$\Omega$	22 38 8
$\angle$	64 7 1	$\perp$	35 37 4	$\Delta$	36 36 8
		$\perp$	41 12 6	$\square$	64 32 8
		$\angle$	69 8 6		
$\angle$	$10^{\circ} 26' 4''$	$\angle$	$24^{\circ} 56' 7''$	$\angle$	$11^{\circ} 19' 4''$
$\perp$	16 1 6	$\Omega$	38 54 7	$\perp$	16 54 6
$\Omega$	24 24 4	$\perp$	47 17 5	$\angle$	25 17 4
$\Delta$	38 22 4	$\ast$	52 52 7	$\ast$	39 15 4
$\square$	66 18 4			$\Omega$	50 25 8
				$\square$	67 11 4

## Ex 25 [Page 30]

$\angle$	M.C. $13^{\circ} 36' 9''$	$\angle$	M.C. $15^{\circ} 29' 5''$	$\angle$	M.C. $20^{\circ} 39' 3''$
$\Delta$	45 40 9	$\Delta$	47 20 0	$\Delta$	52 40 2
$\Omega$	61 42 9	$\Omega$	63 15 3	$\Omega$	68 40 6
$\perp$	71 70 1	$\perp$	72 48 4		
$\Omega$	M.C. $7^{\circ} 54' 1''$	$\angle$	M.C. $28^{\circ} 6' 3''$	$\angle$	M.C. $12^{\circ} 36' 2''$
$\Omega$	19 11 7	$\perp$	33 56 6	$\ast$	25 15 7
$\square$	36 4 0	$\angle$	42 42 1	$\angle$	41 5 6
$\Delta$	67 57 0	$\ast$	57 17 9	$\perp$	50 35 4
		$\Omega$	68 58 6	$\perp$	56 55 3
$\angle$	M.C. $14^{\circ} 36' 3''$	$\angle$	M.C. $11^{\circ} 12' 9''$	$\angle$	M.C. $25^{\circ} 27' 1''$
$\ast$	27 16 4	$\ast$	40 41 7	$\Omega$	44 15 4
$\angle$	43 6 5	$\perp$	46 35 5	$\perp$	53 47 3
$\perp$	52 36 0	$\Omega$	55 26 1	$\perp$	60 8 6
$\perp$	55 55 7	$\Delta$	70 10 5		

## Ex. 26 [Page 30]

$\epsilon \times \text{Asc. } 13^{\circ} 36'9$	$\kappa \times \text{Asc. } 15^{\circ} 22'5$	$\iota \times \text{Asc. } 20^{\circ} 39'3$
$\times$ 45 40'9	$\times$ 47 20'0	$\times$ 52 40'2
$\iota$ 52' 5'7	$\iota$ 53 42'1	$\iota$ 59 4'4
$\epsilon$ 61 42'9	$\epsilon$ 63 15'3	$\epsilon$ 68 40'7
$O \times \text{Asc. } 7^{\circ} 57'1$	$\epsilon \cap \text{Asc. } 16^{\circ} 25'6$	$\eta \times \text{Asc. } 25^{\circ} 15'9$
$\epsilon$ 36 4'1	$\times$ 28 6'3	$\pm$ 31 35'8
$\times$ 67 57'1	$\epsilon$ 42 42'1	$\cap$ 41 5'6
$\iota$ 71 19'8	$\iota$ 51 27'6	$\Delta$ 56 55'3
	$\times$ 57 17'9	
$\pi \times \text{Asc. } 27^{\circ} 16'4$	$\epsilon \cap \text{Asc. } 11^{\circ} 12'9$	$\epsilon \times \text{Asc. } 28^{\circ} 22'1$
$\pm$ 33 36'4	$\Delta$ 40 41'6	$\iota$ 34 43'4
$\cap$ 43 6'5	$\cap$ 55 26'0	$\epsilon$ 44 15'4
$\Delta$ 58 56'6	$\pm$ 61 16'6	$\times$ 60 8'6
	$\times$ 70 10'4	

## Ex. 27 [Page 30]

$\epsilon \times \epsilon$ 30' 3"1	$\epsilon \times \epsilon$ 17' 3"1	$\epsilon \cap \epsilon$ 2' 59'4
$\iota$ 36 27'9	$\times$ 49 7'1	$\cap$ 20 39'4
$\epsilon$ 46 5'1	$\iota$ 55 31'9	$\times$ 33 29'0
$\times$ 62 7'1	$\epsilon$ 65 9'1	$\epsilon$ 49 31'0
$\cap$ 74 56'7		$\iota$ 59 8'2
		$\times$ 65 33'0
$\epsilon \times \cap$ 18' 3"9	$\epsilon \times \cap$ 20' 5"2	$\epsilon \cap \epsilon$ 14' 48"8
$\times$ 50 7'9	$\times$ 52 9'2	$\Delta$ 46 52'8
$\pm$ 56 32'7	$\pm$ 58 34'0	$\cap$ 62 54'8
$\cap$ 66 9'9	$\cap$ 68 11'2	$\pm$ 72 32'0
$\epsilon \times O$ 5' 43"0	$\epsilon \times \cap$ 22' 0"8	$\epsilon \times \epsilon$ 28' 2"3
$\iota$ 11 18'2	$\iota$ 28 25'6	$\iota$ 34 27'1
$\epsilon$ 20 34'9	$\epsilon$ 38 2'8	$\epsilon$ 44 4'3
$\times$ 36 36'9	$\times$ 54 4'8	$\times$ 60 6'3
$\cap$ 49 26'5	$\cap$ 66 54'4	$\cap$ 72 55'9
$\pm$ 68 40'9		

## Ex. 28 [Page 30]

$\frac{1}{2} \Delta \frac{1}{2}$	29° 48'9	$\frac{1}{2} \delta \frac{1}{2}$	1° 46'0	$\frac{1}{2} \delta \frac{1}{2}$	18° 54'3
$\perp$	36 11'0	$\Delta$	31 48'8	$\Delta$	50 44'8
$\angle$	45 44'1	$\perp$	38 10'9	$\perp$	57 6'9
*	61 39'4	$\angle$	47 44'0	$\angle$	66 40'0
Q	74 23'6	*	63 39'3		
$\frac{1}{2} \square \frac{1}{2}$	4° 46'8	$\frac{1}{2} \delta \frac{1}{2}$	19° 54'8	$\frac{1}{2} \delta \frac{1}{2}$	21° 55'1
Q	22 29'0	$\pi$	51 45'3	$\pi$	53 45'6
*	35 13'2	$\pm$	58 7'4	$\pm$	60 7'7
$\angle$	51 8'5	Q	67 40'5	Q	69 40'8
$\perp$	60 41'6				
$\Delta$	67 3'7				
$\frac{1}{2} \square \frac{1}{2}$	16° 40'9	$\frac{1}{2} \Delta \odot$	7° 31'7	$\frac{1}{2} \Delta \frac{1}{2}$	23° 50'0
$\Delta$	48 31'4	$\perp$	13 9'6	$\perp$	30 12'1
Q	64 26'7	$\angle$	22 24'5	$\angle$	39 45'2
$\pm$	73 59'8	*	38 19'8	*	55 40'5
		Q	51 4'0	Q	68 24'7
		$\square$	70 10'3		

## Ex. 29 [Page 30]

$\frac{1}{2} \Delta \frac{1}{2}$	29° 2'4	$\frac{1}{2} \delta \frac{1}{2}$	5° 15'5	$\frac{1}{2} \delta \frac{1}{2}$	7° 0'8
$\perp$	35 26'9	$\Delta$	35 3'4	$\Delta$	37 3'9
$\angle$	45 2'9	$\perp$	41 27'6	$\perp$	43 28'1
*	61 3'3	$\angle$	51 3'9	$\angle$	53 4'4
Q	73 51'7	*	67 4'3	*	69 4'8
$\frac{1}{2} \delta \frac{1}{2}$	24° 5'2	$\frac{1}{2} \square \frac{1}{2}$	10° 0'5	$\frac{1}{2} \delta \frac{1}{2}$	25° 6'0
$\Delta$	56 6'1	Q	27 41'0	$\pi$	57 6'9
$\perp$	62 30'3	*	40 29'4	$\pm$	63 31'1
$\angle$	72 6'6	$\angle$	56 29'8	Q	73 7'4
		$\perp$	66 6'1		
		$\Delta$	72 30'3		
$\frac{1}{2} \delta \frac{1}{2}$	27° 7'0	$\frac{1}{2} \square \frac{1}{2}$	4° 54'5	$\frac{1}{2} \Delta \odot$	12° 44'5
$\pi$	59 7'9	$\square$	21 51'0	$\perp$	18 20'3
$\pm$	65 32'1	$\Delta$	63 51'9	$\angle$	27 36'5
				*	43 36'9
				Q	56 25'3

## Ex. 30 [Page 30]

○ $\propto$ ○	28° 7' 0	○ $\delta$ $\delta$	15° 19' 0	○ $\delta$ $\delta$	20° 35' 9
$\perp$	33 44' 3	$\propto$	44 25' 2	$\propto$	50 24' 6
$\angle$	42 59' 5	$\perp$	50 47' 9	$\perp$	56 47' 3
$\#$	58 56' 0	$\angle$	60 21' 8	$\angle$	66 21' 2
Q	71 41' 2				
○ $\delta$ $\delta$	22° 21' 8	○ $\perp$ $\delta$	5° 20' 6	○ $\square$ $\psi$	25° 22' 3
$\propto$	52 24' 7	$\propto$	10 57' 9	Q	43 4' 0
$\perp$	58 47' 4	$\delta$	39 29' 1	$\#$	55 49' 2
$\angle$	68 21' 3	$\propto$	71 22' 1	$\angle$	71 45' 7
○ $\pm$ $\gamma$	6° 14' 0	○ $\pm$ $\psi$	8° 0' 3	○ $\#$ $\gamma$	9° 0' 1
$\pi$	11 51' 3	$\pi$	13 37' 6	Q	20 14' 9
$\#$	40 29' 8	$\delta$	42 30' 3	$\square$	37 15' 5
$\pi$	72 22' 8	$\pi$	74 23' 3	$\Delta$	69 8' 5

## Ex. 31 [Page 30]

$\gamma$ $\propto$ $\gamma$	29° 11' 7	$\gamma$ $\angle$ ○	5° 55' 1	$\gamma$ $\#$ $\gamma$	6° 33' 4
$\perp$	35 2' 0	$\perp$	14 0' 6	$\angle$	21 9' 2
$\angle$	43 47' 5	$\propto$	19 50' 9	$\perp$	29 54' 7
$\#$	58 123' 3	$\delta$	49 2' 6	$\propto$	35 45' 0
Q	70 4' 0			$\delta$	64 56' 7
$\gamma$ $\square$ $\delta$	0° 21' 8	$\gamma$ Q $\delta$	2° 11' 8	$\gamma$ $\square$ $\delta$	2° 2' 4
$\#$	12 2' 5	$\#$	13 52' 5	Q	19 33' 4
$\angle$	26 38' 3	$\angle$	28 28' 3	$\#$	31 14' 1
$\perp$	35 23' 8	$\perp$	37 13' 8	$\angle$	45 49' 9
$\propto$	41 14' 1	$\propto$	43 4' 1	$\perp$	54 35' 4
$\delta$	70 25' 8	$\delta$	72 15' 8	$\propto$	60 25' 7
$\gamma$ $\pi$ $\delta$	16° 59' 9	$\gamma$ $\square$ $\psi$	2° 57' 9	$\gamma$ $\square$ $\psi$	4° 48' 2
$\pm$	22 50' 2	$\Delta$	32 9' 6	$\Delta$	33 59' 9
Q	31 35' 7	Q $\square$	46 45' 4	Q	148 35' 7
$\Delta$	46 11' 5	$\pm$	55 30' 9	$\pm$	57 21' 2
		$\pi$	61 21' 2	$\pi$	63 11' 5



## Ex. 32 [Page 30]

31° 39' 3	13° 47' 1	0° 29' 1
37 59' 2	26 26' 8	16 18' 8
47 29' 0	42 16' 5	47 58' 1
63 18' 7	51 46' 3	66 57' 7
	58 6' 2	
1° 54' 1	7° 51' 0	9° 50' 2
8 14' 0	14 10' 9	16 10' 1
17 43' 8	23 40' 7	25 39' 9
33 33' 5	39 30' 4	41 29' 6
65 12' 8	71 9' 7	73 8' 9
28° 39' 5	13° 13' 4	22° 29' 7
34 59' 4	29 3' 1	35 59' 6
44 29' 2	38 22' 9	45 29' 4
60 18' 9	44 52' 8	61 19' 9
		73 58' 8

## Ex. 33 [Page 30]

31° 40' 3	1° 59' 7	15° 47' 2
38 0' 4	33 40' 0	28 27' 3
47 30' 5	40 0' 1	44 17' 4
63 20' 6	49 30' 2	53 47' 5
	65 20' 3	60 7' 6
2° 28' 9	3 53' 9	9° 50' 9
18 19' 0	10 13' 9	16 10' 9
49 59' 9	19 44' 0	25 41' 0
68 59' 4	35 34' 1	41 31' 0
	67 14' 4	73 11' 4
11° 50' 1	30° 40' 1	15° 13' 5
18 10' 1	37 0' 1	31 3' 6
27 40' 2	46 30' 2	40 33' 7
43 30' 3	62 20' 3	46 53' 7

## Ex. 34 [Page 30]

$\angle$	$29^{\circ} 28''8$	$\angle$	$15^{\circ} 18''5$	$\angle$	$17^{\circ} 9''9$
$\perp$	$35 22'6$	$\square$	$32 59'7$	$\square$	$34 51'1$
$\angle$	$44 13'1$	$*$	$44 47'3$	$*$	$46 38'7$
$*$	$58 57'5$	$\angle$	$59 31'7$	$\angle$	$61 23'1$
$\square$	$70 45'1$	$\perp$	$68 22'2$	$\perp$	$70 13'6$
		$\angle$	$74 16'0$		
$\angle$	$12^{\circ} 18''9$	$\angle$	$2^{\circ} 52''7$	$\angle$	$18^{\circ} 56'2$
$\perp$	$41 47'7$	$\square$	$17 37'1$	$\square$	$33 40'6$
$\pm$	$47 41'5$	$\pm$	$26 27'7$	$\pm$	$42 31'2$
$\square$	$56 32'1$	$\perp$	$32 21'5$	$\perp$	$48 25'0$
$\Delta$	$71 16'5$	$\angle$	$61 50'3$		
$\angle$	$24^{\circ} 28''6$	$\angle$	$26^{\circ} 19''5$	$\angle$	$14^{\circ} 22''5$
$\square$	$39 13'0$	$\square$	$41 3'9$	$\Delta$	$43 51'3$
$\pm$	$48 3'6$	$\pm$	$49 54'5$	$\square$	$58 35'7$
$\perp$	$53 57'4$	$\perp$	$55 48'3$	$\pm$	$67 26'3$
				$\perp$	$73 20'1$

## Ex. 35 [Page 30]

$\angle$	$31^{\circ} 46''5$	$\angle$	$3^{\circ} 34''3$	$\angle$	$1^{\circ} 0''4$
$\perp$	$38 7'8$	$*$	$16 16'9$	$\perp$	$32 46'9$
$\angle$	$47 39'8$	$\angle$	$32 10'1$	$\pm$	$39 8'2$
$*$	$63 33'0$	$\perp$	$41 42'1$	$\square$	$48 40'1$
		$\angle$	$48 3'4$	$\Delta$	$64 33'4$
$\angle$	$3^{\circ} 0''4$	$\angle$	$29^{\circ} 33''3$	$\angle$	$3^{\circ} 29''7$
$\perp$	$34 46'9$	$\square$	$45 26'6$	$*$	$19 23'0$
$\pm$	$41 8'2$	$\pm$	$54 58'5$	$\square$	$32 5'6$
$\square$	$50 40'1$	$\perp$	$61 19'8$	$\square$	$51 9'5$
$\Delta$	$66 33'4$				
$\angle$	$4^{\circ} 54''9$	$\angle$	$10^{\circ} 53''2$	$\angle$	$12^{\circ} 52''8$
$\perp$	$11 16'2$	$\perp$	$17 14'5$	$\perp$	$19 14'1$
$\angle$	$20 48'2$	$\angle$	$26 46'5$	$\angle$	$28 46'1$
$*$	$36 41'4$	$*$	$42 39'7$	$*$	$44 39'3$
$\square$	$49 24'0$	$\square$	$55 22'3$	$\square$	$57 21'9$
$\square$	$68 27'9$	$\square$	$74 26'2$		



## LESSON IV [Pages 47 to 53]

## Ex. 46 [Page 52]

Body	R. A.	Diff	S. D. A.	S. N. A.	U. M. D.	L. M. D.
†	212° 42' 8	89° 39' 9	87° 35' 0	92° 25' 0	1° 5' 4	178° 54' 6
⊙	259 54' 2	47 11' 4	84 20' 9	95 39' 1	48 16' 8	131 43' 2
♂	274 57' 0	15 2' 8	83 57' 2	96 2' 8	63 19' 6	116 40' 4
♂	280 36' 5	5 39' 5	84 28' 5	95 31' 5	68 59' 0	111 1' 0
♀	281 48' 6	1 12' 1	83 48' 1	95 11' 9	70 11' 2	109 48' 8
♂	299 42' 3	17 53' 7	84 40' 5	95 19' 5	83 4' 8	91 55' 2
♂	20 24' 6	80 42' 3	91 33' 7	88 26' 3	168 47' 1	11 12' 9
♂	121 0' 5	100 35' 9	95 0' 8	84 59' 2	90 37' 0	89 23' 0
♂	123 2' 9	2 2' 4	94 58' 0	85 2' 0	88 34' 6	91 25' 4

## Ex. 50 [Page 53]

1st Mer. Half		2nd Mer. Half	
♂ R. P. ⊙	68° 8' 4	♂ R. P. ♂	75° 4' 2
R. P. ♀	45 19' 0	R. P. ♀	66 53' 6
R. P. ♀	4 48' 6	♂ R. P. ♀	65 40' 3
R. P. ♀	3 52' 4		

## Ex. 51 [Page 53]

1st Mer. Half		2nd Mer. Half	
♂ R. P. ♀	59° 41' 6	♀ R. P. ♂	46° 6' 7
R. P. ♂	3 54' 8	R. P. ♀	54 43' 9
R. P. ♀	4 57' 9	R. P. ♀	55 52' 7
		R. P. ♂	58 25' 7
		R. P. ⊙	66 33' 6

Examples 42 to 59 have been erroneously numbered in the body of the book as examples 32 to 49.

## LESSON V [Pages 54 to 69]

## Ex. 52 [Page 66]

	S. A. with Lat.	T. P. L.	S. A. with No Lat	T. P. L.
♂	95° 19' 5	0'27606	94° 59' 8	0'27757
♀	88 26' 3	0'30863	88 3' 8	0'31048
♀	95 0' 8	0'27749	94 55' 4	0'27790
♀	94 58' 0	0'27770	94 49' 0	0'27839
♂	87 35' 0	0'31285	86 58' 6	0'31587
⊙	84 20' 9	0'32920	84 20' 9	0'32920
♂	83 57' 2	0'33123	84 16' 8	0'32953
♂	84 28' 5	0'32854	84 21' 6	0'32914
♂	83 48' 1	0'33202	84 22' 7	0'32904

From		To MC	?	O	D	'	u	Asc	+	u	2	u
MC	—	0° 11 2	40° 51 3	60° 38 1	65° 54 4	66 49 5	60° 42 1	83° 30 0	16° 29 7	[ 95° 4 7]	[ 93° 10 4]	
?	[0 11 2]	—	46 40 1	60 26 9	65 43 2	66 38 3	80 30 9	83 18 5	167 18 5	[ 95 15 9]	[ 93 21 6]	
O	[46 51 3]	[46 40 1]	—	13 46 8	19 3 1	19 58 2	33 50 8	36 39 7	120 33 4	[141 56 0]	[140 1 7]	
D	[60 38 1]	[60 26 9]	[13 46 8]	—	5 16 3	6 11 4	*20 4 0	22 51 9	106 51 6	[155 43 8]	[153 49 5]	
'	[65 54 4]	[65 43 2]	[19 3 1]	[5 16 3]	—	0 55 1	14 47 7	17 35 6	101 35 3	[160 59 1]	[159 4 8]	
u	[66 49 5]	[66 38 3]	[19 58 2]	[6 11 4]	[0 55 1]	—	13 5° 6	16 40 5	100 40 2	[161 54 2]	[159 59 9]	
Asc.	[80 42 1]	[80 30 9]	[33 50 8]	[20 4 0]	[14 47 7]	[13 52 6]	—	2 47 9	86 47 6	[173 46 8]	[173 52 5]	
+	[83 30 0]	[83 18 8]	[36 38 7]	[22 51 9]	[17 35 6]	[16 40 5]	[2 47 9]	—	83 59 7	[178 34 7]	[176 40 4]	
u	[167 29 7]	[167 18 5]	[120 38 4]	[106 51 6]	[101 35 3]	[100 40 2]	[86 47 6]	[83 59 7]	—	97 25 6	99 19 9	
2	95 4 7	95 15 9	141 56 0	155 43 8	169 59 1	161 54 2	175 46 8	178 34 7	[ 97 25 6]	—	1 54 3	
u	93 10 4	93 21 6	140 1 7	153 49 5	159 4 8	159 59 9	173 52 5	176 40 4	[ 99 19 9]	[ 1 54 3]	—	

Note—Figures with no brackets are Anti Clockwise and Unrectified S D s or Clockwise and Rectified S D s

Figures within brackets are Anti Clockwise and Rectified S D s or Clockwise and Unrectified S D s

*In Direct directions to Increasing aspects  
and in Converse directions to Decreasing aspects*

SPs in their order	°	*	0	Δ	ρ	°	Δ	3"3	12"	3"3	154°	3 3	214°	3 3
°	214°	3 3	274°	3 3	304°	3 3	334°	3 3	34°	3 3	94°	3"3	124°	3"3
○	260	43 4	320	43 4	350	43 4	20	43 4	80	43 4	140	43 7	170	43 4
▷	274	30 2	334	30 2	4	30 2	34	30 2	94	30 2	154	30 2	184	30 2
ℓ	279	46 5	339	46 5	9	46 5	39	46 5	99	48 5	159	46 5	189	46 5
ℓ	280	41 6	340	41 6	10	41 6	40	41 6	100	41 6	160	41 6	190	41 6
ℓ	297	22 1	357	22 1	27	22 1	57	22 1	117	22 1	177	22 1	207	22 1
ℓ	21	21 8	81	21 8	111	21 8	141	21 8	201	21 8	261	21 8	291	21 8
u	118	47 4	178	47 4	208	47 4	238	47 4	298	47 4	358	47 4	28	47 4
u	120	41 7	180	41 7	210	41 7	240	41 7	300	41 7	0	41 7	30	41 7
°														

*In Direct directions to Decreasing aspects  
and in Converse directions to Increasing aspects*

Ex. 55 [Page 66]

Long of Limits	S A	M D	R A.	O A.H	Sum of T P.L.s S A	Long. of Limits	S A.	M D	R A	O A.H
0° 41' 7"	80° N 562	30 L 59.1	0° 38' 3"	0° 34' 5"	0° 46279	180° 41' 7"	89° D 56' 2"	30° U 59' 1"	180° 38' 3"	180° 42' 1"
4° 30' 2"	80° N 352	27 L 29.4	4° 8' 0"	3° 43' 2"	0° 51307	184° 30' 2"	89° D 35' 2"	27° U 29' 4"	184° 8' 0"	184° 32' 8"
9° 43' 5"	89° N 63	22 L 38.5	8° 58' 9"	8° 5' 2"	0° 59499	189° 46' 5"	89° D 6' 3"	22° U 38.5	188° 58' 9"	189° 52' 6"
10° 41' 6"	89° N 30	21 L 47.7	9° 49' 7"	8° 52' 7"	0° 61128	190° 41' 6"	89° D 3' 0"	21° U 47.7	189° 49' 7"	190° 46' 7"
20° 43' 4"	88° N 72	11 L 23.9	19° 8' 5"	17° 15' 7"	0° 68881	200° 43' 4"	88° D 7' 2"	12° U 23.9	199° 8' 5"	201° 1' 3"
21° 21' 8"	88° N 38	11 L 52.9	19° 44' 5"	17° 48' 2"	0° 68991	201° 21' 8"	88° D 3' 8"	11° U 52.9	199° 44' 5"	201° 40' 6"
27° 22' 1"	87° N 32.5	6 L 13.2	25° 24' 2"	22° 56' 7"	1° 14842	207° 22' 1"	87° D 32' 5"	6° U 13.2	205° 24' 2"	207° 51' 7"
28° 47' 4"	87° N 27.0	4 L 52.1	26° 43' 3"	24° 12' 3"	1° 25438	208° 47' 4"	87° D 27' 0"	4° U 52.1	206° 45' 3"	209° 18' 3"
34° 3' 3"	86° N 58.6	0 L 10.7	31° 48' 1"	28° 46' 8"	1° 56580	210° 41' 7"	87° D 15' 5"	3° U 3' 0"	208° 34' 4"	211° 18' 9"
34° 30' 2"	86° N 56.5	0 L 36.7	32° 14' 1"	29° 10' 6"	2° 03858	214° 30' 2"	86° D 58' 6"	0° U 10.7	211° 48' 1"	214° 49' 4"
39° 46' 5"	85° N 31.2	5 L 44.7	37° 22' 1"	33° 53' 3"	2° 15274	214° 30' 2"	86° D 56' 5"	0° U 36.7	212° 14' 1"	215° 17' 6"
40° 41' 6"	86° N 26.9	6 L 38.9	38° 16' 3"	34° 43' 2"	1° 11783	219° 46' 5"	86° D 31' 2"	5° U 44.7	217° 22' 1"	220° 50' 9"
57° 22' 1"	85° N 17.7	23 L 27.8	55° 5' 2"	50° 22' 9"	1° 11404	220° 41' 6"	86° D 26' 9"	6° U 38' 9"	218° 16' 3"	221° 49' 4"
58° 47' 4"	85° N 12.8	24 L 56.2	56° 33' 6"	51° 46' 4"	0° 56053	217° 22' 1"	85° D 17' 7"	23° U 27' 8"	215° 5' 2"	219° 47' 5"
60° 41' 7"	85° N 63	26 L 55.1	58° 32' 5"	53° 38' 8"	0° 53166	238° 47' 4"	85° D 12' 6"	24° U 55.2	236° 33' 6"	241° 20' 8"
80° 43' 4"	84° N 20.9	48 L 16.9	79° 34' 3"	74° 15' 2"	0° 49900	240° 41' 7"	85° D 6' 3"	26° U 55.1	238° 32' 5"	243° 26' 2"
81° 21' 8"	84° N 20.2	48 L 58.5	80° 35' 9"	74° 56' 1"	0° 24229	260° 43' 4"	84° D 20' 2"	48° U 16' 9"	259° 54' 3"	263° 33' 4"
94° 3' 3"	84° N 16.6	62 L 47.7	94° 25' 1"	88° 41' 7"	0° 23605	261° 21' 8"	84° D 16' 6"	62° U 58' 5"	260° 35' 9"	266° 15' 7"
94° 30' 2"	84° N 16.8	63 L 17.0	94° 54' 4"	89° 11' 2"	0° 12778	274° 3' 3"	84° D 21' 6"	63° U 17' 0"	274° 25' 1"	280° 8' 3"
99° 46' 5"	84° N 21.6	60 L 0.7	100° 38' 1"	94° 59' 7"	0° 08721	274° 30' 2"	84° D 21' 6"	60° U 0.7	274° 54' 4"	280° 37' 6"
100° 41' 6"	84° N 22.7	70 L 0.4	101° 37' 8"	96° 0' 5"	0° 08409	279° 46' 5"	84° D 22' 7"	70° U 0.4	280° 35' 2"	286° 16' 3"
111° 21' 8"	84° N 43.3	81 L 28.1	113° 5' 5"	107° 48' 8"	0° 01700	281° 21' 8"	84° D 43' 3"	81° U 28.1	281° 37' 8"	287° 15' 1"
117° 22' 1"	94° D 59.8	92 U 11.4	119° 20' 0"	114° 26' 2"	0° 01302	297° 22' 1"	94° N 59' 8"	92° L 11.4	293° 5' 5"	298° 22' 2"
120° 41' 7"	94° D 53.4	90 U 42.1	120° 35' 4"	116° 0' 0"	0° 01976	298° 47' 4"	94° N 55' 4"	90° L 42.1	299° 26' 0"	304° 25' 8"
124° 3' 3"	94° D 49.0	88 U 43.0	122° 54' 4"	118° 5' 4"	0° 04274	304° 3' 3"	94° N 49' 0"	88° L 43.0	302° 54' 4"	307° 43' 4"
140° 43' 4"	93° D 26.5	68 U 14.5	126° 22' 9"	121° 45' 8"	0° 13483	320° 43' 4"	93° N 26' 5"	68° L 14.5	306° 22' 9"	311° 0' 0"
141° 21' 8"	93° D 23.5	67 U 52.6	143° 44' 8"	140° 21' 3"	0° 13355	321° 21' 8"	93° N 23' 5"	67° L 52.6	323° 44' 8"	327° 8' 3"
154° 3' 3"	92° D 20.2	55 U 15.2	156° 22' 2"	153° 36' 6"	0° 21970	334° 3' 3"	92° N 17' 9"	55° L 15.2	335° 56' 8"	338° 40' 1"
154° 30' 2"	92° D 17.9	55 U 15.2	156° 22' 2"	154° 4' 3"	0° 22283	334° 3' 3"	92° N 17' 9"	55° L 15.2	336° 22' 2"	343° 9' 6"
159° 46' 5"	91° D 50.1	50 U 17.9	161° 19' 5"	159° 20' 4"	0° 26145	339° 46' 5"	91° N 50' 1"	50° L 17.9	341° 19' 5"	343° 56' 2"
160° 41' 6"	91° D 45.2	49 U 26.4	162° 11' 0"	160° 25' 8"	0° 26954	340° 41' 6"	91° N 45' 2"	49° L 26.4	342° 11' 0"	343° 56' 2"
170° 43' 4"	90° D 51.0	40 U 8.8	171° 28' 6"	170° 30' 6"	0° 35468	350° 43' 4"	90° N 51' 0"	40° L 8.8	351° 28' 6"	352° 19' 6"
177° 22' 1"	90° D 14.5	34 U 2.3	177° 35' 1"	177° 30' 6"	0° 42444	357° 22' 1"	90° N 14' 5"	34° L 2.3	357° 35' 1"	357° 49' 6"
178° 47' 4"	90° D 6.6	32 U 43.9	178° 53' 5"	178° 46' 9"	0° 43980	353° 47' 4"	90° N 6' 6"	32° L 43.9	358° 33' 5"	359° 0' 1"

## Ex. 56 [Page 66]

M.C. $\delta$ $\varphi$	Impossible
M.C. $\ast$ $\varphi$	52 47'7
M.C. $\delta$ $\odot$	48 6'0
M.C. $\ast$ $\uparrow$	0 36'7
M.C. $\delta$ $\uparrow$	63 17'0
M.C. $\ast$ $\downarrow$	5 44'7
M.C. $\delta$ $\downarrow$	69 0'7
M.C. $\ast$ $\downarrow$	6 38'9
M.C. $\delta$ $\varphi$	70 0'4
M.C. $\ast$ $\delta$	23 27'8
M.C. $\Delta$ $\downarrow$	48 58'5
M.C. $\Delta$ $\uparrow$	25 6'2
M.C. $\Delta$ $\varphi$	26 55'1

## Ex. 57 [Page 66]

Asc. $\ast$ $\varphi$	61° 49'9
Asc. $\square$ $\varphi$	3 51'2
Asc. $\Delta$ $\downarrow$	35 21'7
Asc. $\Delta$ $\uparrow$	60 16'6
Asc. $\Delta$ $\varphi$	58 11'2
Asc. $\ast$ $\varphi$	22 28'9
Asc. $\delta$ $\odot$	36 4'0
Asc. $\delta$ $\uparrow$	21 0'0
Asc. $\delta$ $\downarrow$	15 20'9
Asc. $\delta$ $\varphi$	14 22'3

## Ex. 58 [Page 66]

$\varphi$ $\ast$ $\varphi$	57° 58'7
$\varphi$ $\delta$ $\delta$	16 27'4
$\varphi$ $\ast$ $\delta$	63 31'7
$\varphi$ $\square$ $\downarrow$	9 23'9
$\varphi$ $\ast$ $\uparrow$	39 53'8
$\varphi$ $\delta$ $\uparrow$	17 53'7
$\varphi$ $\Delta$ $\uparrow$	74 52'2
$\varphi$ $\delta$ $\downarrow$	19 48'3
$\varphi$ $\square$ $\varphi$	22 37'9
$\varphi$ $\Delta$ $\varphi$	51 48'5
$\varphi$ $\ast$ $\odot$	39 17'4
$\varphi$ $\square$ $\odot$	67 18'3
$\varphi$ $\ast$ $\uparrow$	52 13'4
$\varphi$ $\varphi$ $\downarrow$	57 7'5

## Ex. 59 [Page 66]

$\downarrow$ $\delta$ $\downarrow$	Impossible
$\downarrow$ $\ast$ $\downarrow$	63° 22'4
$\downarrow$ $\delta$ $\uparrow$	5 33'3
$\downarrow$ $\ast$ $\uparrow$	68 23'4
$\downarrow$ $\delta$ $\odot$	20 37'7
$\downarrow$ $\ast$ $\varphi$	6 3'4
$\downarrow$ $\delta$ $\varphi$	68 48'6
$\downarrow$ $\Delta$ $\downarrow$	42 15'8
$\downarrow$ $\square$ $\downarrow$	71 56'3
$\downarrow$ $\Delta$ $\uparrow$	44 15'7
$\downarrow$ $\square$ $\uparrow$	73 40'5
$\downarrow$ $\Delta$ $\varphi$	19 55'7
$\downarrow$ $\ast$ $\delta$	45 44'7
$\downarrow$ $\square$ $\delta$	74 59'1
$\downarrow$ $\ast$ $\varphi$	62 29'2

N. B.—In Exercises 56 to 59 the minor directions have been left out.



Ex. 60—Prepare the schedule of dates measured to by every minute of arc in the A. D.'s of the primary mundane and zodiacal directions obtaining in the standard nativity.

Arc	In Ordinary year	In Leap year	Arc	In Ordinary year	In Leap year
1'	Dec. 19	Dec 19	31'	June 19	June 19
2	" 25	" 28	32	" 25	" 25
3	" 31	" 31	33	July 1	July 1
4	Jan. 6	Jan. 6	34	" 7	" 7
5	" 12	" 13	35	" 13	" 14
6	" 19	" 19	36	" 19	" 20
7	" 25	" 28	37	" 25	" 28
8	" 31	" 31	38	" 31	Aug. 1
9	Feb. 6	Feb. 6	39	Aug. 6	" 7
10	" 12	" 12	40	" 13	" 13
11	" 18	" 18	41	" 19	" 19
12	" 24	" 24	42	" 26	" 25
13	Mar. 2	Mar. 1	43	Sep. 1	" 31
14	" 8	" 7	44	" 7	Sep. 6
15	" 14	" 14	45	" 13	" 13
16	" 20	" 20	46	" 19	" 19
17	" 26	" 26	47	" 25	" 25
18	Apr. 2	Apr. 1	48	Oct. 1	Oct. 1
19	" 8	" 7	49	" 7	" 7
20	" 14	" 13	50	" 13	" 13
21	" 20	" 19	51	" 19	" 19
22	" 26	" 25	52	" 25	" 25
23	May 2	May 1	53	" 31	" 31
24	" 8	" 7	54	Nov. 7	Nov. 6
25	" 14	" 14	55	" 13	" 13
26	" 20	" 20	56	" 19	" 19
27	" 26	" 26	57	" 25	" 25
28	June 1	June 1	58	Dec. 1	Dec. 1
29	" 7	" 7	59	" 7	" 7
30	" 13	" 13	60	" 13	" 13

# TABLES

.

Table I—Right Ascension of every Ecliptic Degree

Table II—Declination of every Ecliptic Degree

Longitude.	R A		Variation of Long. per minute	Decl	Variation of Decl. per minute	Longitude.	R A		Variation of Long. per minute	Decl	Variation of Decl. per minute
1°	0° 53'	27	55 052	0° 23' 52" 6	23 868	46°	43° 31' 52" 7	60 048	16° 38' 31"	17 167	+
2	1 50 58		55 060	0 47 44 7	23 854	47	44 31 55 6	60 222	16 55 13 1	16 873	
3	2 45 9 4		55 076	1 11 36 2	23 834	48	45 32 9 3	60 576	17 12 5 5	16 575	
4	3 40 14 1		55 098	1 35 26 5	23 814	49	46 32 34 0	60 593	17 28 40 0	16 268	
5	4 33 20 0		55 120	1 59 15 4	23 785	50	47 33 9 6	60 773	17 44 56 1	15 958	
6	5 30 27 5		55 156	2 23 2 5	23 747	51	48 33 56 0	60 958	18 0 53 6	15 642	
7	6 25 36 9		55 193	2 46 47 3	23 705	52	49 34 53 5	61 138	18 16 32 1	15 318	
8	7 20 48 5		55 235	3 10 29 6	23 654	53	50 36 1 8	61 318	18 31 51 2	14 990	
9	8 16 2 6		55 283	3 34 8 9	23 600	54	51 37 20 9	61 500	18 46 50 6	14 655	
10	9 11 19 6		55 335	3 57 44 7	23 534	55	52 38 50 9	61 678	19 1 29 9	14 317	
11	10 6 39 8		55 392	4 21 17 2	23 472	56	53 40 31 6	61 857	19 15 45 9	13 970	
12	11 2 3 4		55 455	4 44 45 5	23 394	57	54 42 23 0	62 031	19 29 47 1	13 618	
13	11 57 30 7		55 525	5 8 9 4	23 317	58	55 44 24 9	62 207	19 43 24 2	13 262	
14	12 53 2 2		55 597	5 31 28 4	23 235	59	56 46 37 3	62 377	19 56 39 9	12 902	
15	13 48 38 0		55 673	5 54 42 3	23 146	60	57 48 59 9	62 548	20 9 34 0	12 533	
16	14 44 18 4		55 757	6 17 50 7	23 042	61	58 51 32 8	62 715	20 22 6 0	12 160	
17	15 40 3 8		55 845	6 40 55 2	22 937	62	59 54 15 7	62 878	20 34 15 6	11 783	
18	16 35 54 5		55 937	7 3 49 4	22 825	63	60 57 8 4	63 040	20 46 2 6	11 402	
19	17 31 50 7		56 033	7 26 38 9	22 708	64	62 0 10 8	63 198	20 57 26 7	11 020	
20	18 27 52 7		56 135	7 49 21 4	22 584	65	63 3 22 7	63 352	21 8 27 5	10 623	
21	19 24 0 8		56 267	8 11 56 5	22 454	66	64 6 43 8	63 502	21 13 4 3	10 225	
22	20 20 15 2		56 352	8 34 23 8	22 320	67	65 10 13 9	63 647	21 29 18 4	9 825	
23	21 16 36 3		56 467	8 56 43 0	22 177	68	66 13 52 7	63 790	21 39 7 9	9 420	
24	22 13 4 3		56 597	9 18 53 6	22 028	69	67 17 40 1	63 927	21 48 33 1	9 012	
25	23 9 39 5		56 708	9 40 55 3	21 875	70	68 21 35 7	64 058	21 57 53 8	8 598	
26	24 6 22 0		56 837	10 2 47 8	21 713	71	69 25 39 2	64 185	22 6 9 7	8 182	
27	25 3 12 2		56 968	10 24 30 6	21 545	72	70 29 50 3	64 307	22 14 20 6	7 790	
28	26 0 10 3		57 103	10 46 3 3	21 372	73	71 34 8 7	64 425	22 22 6 2	7 337	
29	26 57 16 5		57 243	11 7 25 6	21 193	74	72 38 34 2	64 533	22 29 26 4	6 908	
30	27 54 31 1		57 385	11 28 37 2	21 008	75	73 43 6 2	64 638	22 36 20 9	6 478	
31	28 51 54 2		57 532	11 49 37 5	20 813	76	74 47 44 5	64 722	22 42 49 6	6 045	
32	29 49 26 1		57 682	12 10 26 3	20 613	77	75 52 28 8	64 830	22 48 52 3	5 608	
33	30 47 7 1		57 835	12 31 3 1	20 410	78	76 57 18 6	64 915	22 54 28 8	5 170	
34	31 44 57 1		57 992	12 51 27 7	20 197	79	78 2 13 5	64 997	22 59 39 0	4 727	
35	32 42 56 6		58 148	13 11 39 5	19 978	80	79 7 13 3	65 067	23 4 22 6	4 285	
36	33 41 5 5		58 312	13 31 38 2	19 754	81	80 12 17 3	65 135	23 8 39 7	3 840	
37	34 39 24 2		58 477	13 51 23 5	19 525	82	81 17 25 4	65 197	23 12 30 1	3 392	
38	35 37 52 8		58 645	14 10 55 0	19 287	83	82 22 36 9	65 243	23 15 53 6	2 942	
39	36 36 31 5		58 814	14 30 12 2	19 043	84	83 27 51 5	65 288	23 18 50 1	2 493	
40	37 35 20 2		58 985	14 49 14 8	18 795	85	84 33 8 8	65 327	23 21 19 7	2 040	
41	38 34 19 3		59 016	15 8 2 5	18 538	86	85 38 28 4	65 355	23 23 22 1	1 588	
42	39 33 28 8		59 333	15 26 34 8	18 277	87	86 43 49 7	65 378	23 24 57 4	1 135	
43	40 32 48 8		59 510	15 44 51 4	18 008	88	87 49 12 4	65 393	23 26 5 5	0 682	
44	41 32 19 4		59 687	16 2 51 9	17 733	89	88 54 36 0	65 400	23 26 46 4	0 227	
45	42 32 0 6		59 865	16 20 35 9	17 453	90	90 0 0 0	65 400	23 27 0 0	0 227	

Tables I & II—Right Ascension and Declination of every  
Ecliptic Degree—(Contd.)

Longitude	R. A.	Variation of Long. per minute	Decl.	Variation of Decl. per minute	Longitude	R. A.	Variation of Long. per minute	Decl.	Variation of Decl. per minute
91*	91° 5 24' 0	65 393	23° 26' 46" 4	0 65	136*	135° 27 40' 6	59 510	16° 2 51' 9	18 008
92	92 10 47 6	65 378	23 26 5 5	1 13	137	137 27 11 2	59 333	15 44 51 4	18 277
93	93 16 10 3	65 355	23 24 57 4	1 55	138	140 26 31 2	59 016	15 26 34 8	18 538
94	94 21 31 6	65 327	23 23 22 1	2 04	139	141 25 40 7	58 955	15 8 2 5	18 795
95	95 26 51 2	65 296	23 21 19 7	2 49	140	142 24 39 8	58 812	14 49 14 8	19 043
96	96 32 8 5	65 243	23 18 50 1	2 94	141	143 23 28 5	58 64	14 30 12 2	19 287
97	97 37 23 1	65 192	23 15 53 6	3 39	142	144 22 7 2	58 477	14 10 55 0	19 525
98	98 42 34 6	65 135	23 12 30 1	3 84	143	145 20 35 8	58 312	13 51 23 5	19 755
99	99 47 42 7	65 067	23 8 39 7	4 28	144	146 19 51 5	58 148	13 31 38 2	19 978
100	100 52 46 7	64 99	23 4 22 6	4 72	145	147 17 3 4	57 992	13 11 39 5	20 197
101	101 57 46 5	64 915	22 59 39 0	5 17	146	148 15 2 9	57 835	12 51 27 7	20 410
102	102 2 41 4	64 830	22 54 28 8	5 60	147	149 12 53 0	57 682	12 31 3 1	20 613
103	103 7 31 2	64 722	22 48 52 3	6 04	148	150 10 33 9	57 532	12 10 26 3	20 813
104	104 12 15 5	64 638	22 42 49 6	6 47	149	151 8 5 8	57 385	11 49 37 5	21 005
105	105 16 53 8	64 533	22 36 20 9	6 90	150	152 5 28 9	57 243	11 28 37 2	21 193
106	106 21 23 8	64 425	22 29 26 4	7 33	151	153 2 43 5	57 103	11 7 25 6	21 372
107	107 25 51 3	64 307	22 22 6 2	7 79	152	153 59 49 7	56 966	10 46 3 3	21 545
108	108 30 9 7	64 185	22 14 20 6	8 18	153	154 56 47 8	56 837	10 24 30 6	21 713
109	109 34 20 8	64 058	22 6 9 7	8 59	154	155 53 38 0	56 708	10 2 47 8	21 875
110	110 38 24 3	63 927	21 57 33 8	9 01	155	156 50 20 5	56 587	9 40 55 3	22 028
111	111 42 19 9	63 790	21 48 33 1	9 42	156	157 46 55 7	56 467	9 18 53 6	22 177
112	112 46 7 3	63 647	21 39 7 9	9 82	157	158 43 23 7	56 352	8 56 43 0	22 320
113	113 49 46 1	63 502	21 29 18 4	10 22	158	159 39 44 8	56 267	8 34 23 8	22 455
114	114 53 16 2	63 352	21 19 4 9	10 62	159	160 35 59 2	56 135	8 11 56 5	22 585
115	115 56 37 3	63 198	21 8 27 5	11 02	160	161 32 7 3	56 033	7 49 21 4	22 708
116	116 59 42 2	63 040	20 57 26 7	11 40	161	162 28 9 3	55 937	7 26 38 9	22 825
117	117 2 51 6	62 878	20 46 2 6	11 78	162	163 24 5 5	55 845	7 3 49 4	22 937
118	118 5 44 3	62 715	20 34 15 6	12 16	163	164 19 56 2	55 757	6 40 53 2	23 042
119	119 8 27 2	62 548	20 22 6 0	12 53	164	165 15 41 6	55 673	6 17 50 7	23 140
120	120 11 0 1	62 377	20 9 34 0	12 90	165	166 11 22 0	55 59	5 54 42 3	23 232
121	121 13 22 7	62 207	19 56 39 9	13 26	166	167 6 57 8	55 525	5 31 28 4	23 317
122	122 15 35 1	62 031	19 43 24 2	13 61	167	168 2 29 3	55 455	5 8 9 4	23 398
123	123 17 37 0	61 857	19 29 47 1	13 97	168	168 57 56 6	55 393	4 44 45 5	23 472
124	124 19 28 4	61 678	19 15 48 9	14 31	169	169 53 20 2	55 335	4 21 17 2	23 538
125	125 21 9 1	61 500	19 1 29 9	14 65	170	170 48 40 4	55 283	3 57 44 9	23 600
126	126 22 39 1	61 318	18 46 50 6	14 99	171	171 43 57 4	55 235	3 34 8 9	23 655
127	127 23 58 2	61 138	18 31 51 2	15 31	172	172 39 11 5	55 193	3 10 29 6	23 705
128	128 25 6 5	60 958	18 16 32 1	15 64	173	173 34 23 1	55 156	2 46 47 3	23 747
129	129 26 4 0	60 773	18 0 53 6	15 95	174	174 29 32 5	55 120	2 23 2 5	23 785
130	130 26 50 4	60 593	17 44 56 1	16 26	175	175 24 40 0	55 085	1 59 15 4	23 815
131	131 27 26 0	60 578	17 28 40 0	16 57	176	176 19 45 9	55 078	1 35 26 5	23 838
132	132 27 50 7	60 228	17 12 5 5	16 87	177	177 14 50 6	55 060	1 11 36 2	23 858
133	133 28 4 4	60 048	16 55 13 1	17 16	178	178 9 54 2	55 022	0 47 44 7	23 868
134	134 28 7 3	59 868	16 38 3 1	17 45	179	179 4 57 3	55 045	0 23 52 6	23 877
135	135 27 59 4	59 687	16 20 35 9	17 33	180	180 0 0 0	55 045	0 0 0 0	23 877

Tables I & II—Right Ascension and Declination of every  
Ecliptic Degree—(Contd.)

Longitude.	R. A.	Variation of Long. per minute	Decl.	Variation of Decl. per minute	Longitude.	R. A.	Variation of Long. per minute	Decl.	Variation of Decl. per minute
			S	+				S	+
181	180° 55' 2" 7	55 052	0° 23' 52" 6	23 868	226	223° 31' 52" 7	60 048	16° 38' 3" 1	17 167
182	181 50 5 8	55 060	0 47 44 7	23 858	227	224 31 55 6	60 228	16 55 13 1	16 873
183	182 45 9 4	55 078	1 11 36 2	23 838	228	225 32 9 3	60 578	17 12 5 5	16 575
184	183 40 14 1	55 098	1 35 26 5	23 815	229	226 32 34 0	60 593	17 28 40 0	16 268
185	184 35 20 0	55 120	1 59 15 4	23 785	230	227 33 9 6	60 773	17 44 56 1	15 958
186	185 30 27 5	55 156	2 23 2 5	23 747	231	228 33 56 0	60 958	18 0 53 6	15 642
187	186 25 36 9	55 193	2 46 47 3	23 705	232	229 34 53 5	61 138	18 16 32 1	15 318
188	187 20 48 5	55 235	3 10 29 6	23 655	233	230 36 1 8	61 318	18 31 51 2	14 950
189	188 16 2 6	55 283	3 34 8 9	23 600	234	231 37 20 9	61 500	18 46 50 6	14 655
190	189 11 19 6	55 335	3 57 44 9	23 538	235	232 38 50 9	61 678	19 1 29 9	14 317
191	190 6 39 8	55 393	4 21 17 2	23 472	236	233 40 31 6	61 857	19 15 48 9	13 970
192	191 2 3 4	55 455	4 44 45 5	23 398	237	234 42 23 0	62 031	19 29 47 1	13 618
193	191 57 30 7	55 525	5 8 9 4	23 317	238	235 44 24 9	62 207	19 43 24 2	13 262
194	192 53 2 2	55 597	5 31 28 4	23 232	239	236 46 37 3	62 377	19 56 39 9	12 902
195	193 48 38 0	55 673	5 54 42 3	23 140	240	237 48 50 9	62 548	20 9 34 0	12 533
196	194 44 18 4	55 757	6 17 50 7	23 042	241	238 51 32 8	62 715	20 22 6 0	12 160
197	195 40 3 8	55 845	6 40 53 2	22 937	242	239 54 15 7	62 878	20 34 15 6	11 781
198	196 35 54 5	55 937	7 3 49 4	22 825	243	240 57 8 4	63 040	20 46 2 6	11 402
199	197 31 50 7	56 033	7 26 38 9	22 708	244	242 0 10 8	63 198	20 57 26 7	11 020
200	198 27 52 7	56 135	7 49 21 4	22 585	245	243 3 22 7	63 352	21 8 27 5	10 623
201	199 24 0 8	56 267	8 11 56 5	22 455	246	244 6 43 8	63 502	21 19 4 9	10 225
202	200 20 15 2	56 352	8 34 23 8	22 320	247	245 10 13 9	63 647	21 29 18 4	9 825
203	201 16 36 3	56 467	8 56 43 0	22 177	248	246 13 52 7	63 790	21 39 7 9	9 420
204	202 13 4 3	56 587	9 18 53 6	22 028	249	247 17 40 1	63 927	21 48 33 1	9 012
205	203 9 39 5	56 708	9 40 55 3	21 875	250	248 21 35 7	64 058	21 57 33 8	8 598
206	204 6 22 0	56 837	10 2 47 8	21 713	251	249 25 39 2	64 185	22 6 9 7	8 182
207	205 3 12 2	56 968	10 24 30 6	21 545	252	250 29 50 3	64 307	22 14 20 6	7 790
208	206 0 10 3	57 103	10 46 3 3	21 372	253	251 34 8 7	64 425	22 22 6 2	7 337
209	206 57 16 5	57 243	11 7 25 6	21 193	254	252 38 34 2	64 533	22 29 26 4	6 908
210	207 54 31 1	57 385	11 28 37 2	21 005	255	253 43 6 2	64 638	22 36 20 9	6 478
211	208 51 54 2	57 532	11 49 37 5	20 813	256	254 47 44 5	64 722	22 42 49 6	6 045
212	209 49 26 1	57 682	12 10 26 3	20 613	257	255 52 28 8	64 830	22 48 52 3	5 608
213	210 47 7 0	57 835	12 31 3 1	20 410	258	256 57 18 6	64 915	22 54 28 8	5 170
214	211 44 57 1	57 992	12 51 27 7	20 197	259	258 2 13 5	64 997	22 59 39 0	4 727
215	212 42 56 6	58 148	13 11 39 5	19 978	260	259 7 13 3	65 067	23 4 22 6	4 285
216	213 41 5 5	58 312	13 31 38 2	19 755	261	260 12 17 3	65 135	23 8 39 7	3 840
217	214 39 24 2	58 477	13 51 23 5	19 525	262	261 17 25 4	65 192	23 12 30 1	3 392
218	215 37 52 8	58 645	14 10 55 0	19 287	263	262 22 36 9	65 243	23 15 53 6	2 942
219	216 36 31 5	58 812	14 30 12 2	19 043	264	263 27 51 5	65 288	23 18 50 1	2 493
220	217 35 20 2	58 985	14 49 14 8	18 795	265	264 33 8 8	65 327	23 21 19 7	2 040
221	218 34 19 3	59 016	15 8 2 5	18 538	266	265 38 28 4	65 355	23 23 22 1	1 588
222	219 33 28 8	59 333	15 26 34 8	18 277	267	266 43 49 7	65 378	23 24 57 4	1 135
223	220 32 48 8	59 510	15 44 51 4	18 008	268	267 49 12 4	65 393	23 26 5 5	0 652
224	221 32 19 4	59 687	16 2 51 9	17 733	269	268 54 36 0	65 400	23 26 46 4	0 227
225	222 32 0 6	59 868	16 20 35 9	17 453	270	270 0 0	65 400	23 27 0 0	0 227

Tables I & II—Right Ascension and Declination of every  
Ecliptic Degree—(Contd.)

Longitude.	R A	Variation of Long. per minute	Decl.	Variation of Decl. per minute	Longitude	R A	Variation of Long. per minute	Decl.	Variation of Decl. per minute
			S					S	
271*	271° 3 24 0	65 323	23° 26' 46" 4	0 69	316	118° 27 40 6	59 510	16° 2 51 9	18 008
272	272 10 47 6	65 378	23 26 5 5	1 135	317	319 27 11 2	59 333	15 44 51 4	18 277
273	273 16 10 3	65 335	23 24 57 4	1 385	318	320 26 31 2	59 016	15 26 34 8	18 538
274	274 21 31 6	65 327	23 23 22 1	2 040	319	321 25 40 7	58 985	15 8 2 5	18 795
275	275 26 51 2	65 285	23 21 19 7	2 493	320	322 24 39 8	58 812	14 49 14 8	19 043
276	276 32 8 5	65 243	23 18 50 1	2 942	321	323 23 28 5	58 645	14 30 12 2	19 287
277	277 37 23 1	65 192	23 15 53 6	3 39	322	324 22 7 2	58 477	14 10 55 0	19 525
278	278 42 34 6	65 135	23 12 30 1	3 840	323	325 20 35 8	58 312	13 51 23 5	19 755
279	279 47 42 7	65 067	23 8 37 7	4 285	324	326 18 54 5	58 148	13 31 38 2	19 978
280	280 52 46 7	64 997	23 4 22 6	4 72	325	327 17 3 4	57 992	13 11 39 5	20 197
281	281 57 46 3	64 915	22 59 30 0	5 170	326	328 15 2 9	57 835	12 51 27 7	20 410
282	282 2 41 4	64 830	22 54 29 8	5 605	327	329 12 53 0	57 682	12 31 3 1	20 613
283	283 7 31 2	64 722	22 48 52 3	6 045	328	330 10 33 9	57 532	12 10 26 3	20 813
284	284 12 15 5	64 618	22 42 49 6	6 478	329	331 8 5 8	57 385	11 49 37 5	21 005
285	285 16 53 8	64 533	22 36 20 9	6 908	330	332 5 28 9	57 243	11 28 37 2	21 193
286	286 21 25 8	64 425	22 29 26 4	7 337	331	333 2 43 5	57 103	11 7 25 6	21 372
287	287 25 51 3	64 307	22 22 6 2	7 790	332	333 59 49 7	56 968	10 46 3 3	21 545
288	288 30 9 7	64 185	22 14 20 6	8 18	333	334 56 47 8	56 837	10 24 30 6	21 713
289	289 34 20 8	64 058	22 6 9 7	8 595	334	335 53 38 0	56 708	10 2 47 8	21 875
290	290 38 24 3	63 927	21 57 33 8	9 012	335	336 50 20 5	56 587	9 40 55 3	22 028
291	291 42 19 9	63 790	21 48 33 1	9 420	336	337 46 55 7	56 467	9 18 53 6	22 177
292	292 46 7 3	63 647	21 39 7 9	9 825	337	338 43 23 7	56 352	8 56 43 0	22 320
293	293 49 46 1	63 502	21 29 18 4	10 225	338	339 39 44 8	56 267	8 34 23 8	22 455
294	294 53 16 2	63 352	21 19 4 9	10 623	339	340 35 59 2	56 135	8 11 56 5	22 585
295	295 56 37 3	63 198	21 8 27 5	11 020	340	341 32 7 3	56 033	7 49 21 4	22 705
296	296 59 49 2	63 040	20 57 26 7	11 402	341	342 28 9 3	55 93	7 26 38 9	22 825
297	297 2 51 6	62 878	20 46 2 6	11 783	342	343 24 5 5	55 845	7 3 49 4	22 937
298	298 5 44 3	62 715	20 34 15 6	12 160	343	344 19 56 2	55 757	6 40 53 2	23 042
299	299 8 27 2	62 548	20 22 6 0	12 533	344	345 15 41 6	55 673	6 17 50 7	23 140
300	300 11 0 1	62 377	20 9 34 0	12 902	345	346 11 22 0	55 597	5 54 42 3	23 232
301	301 13 22 7	62 207	19 56 39 9	13 262	346	347 6 57 8	55 525	5 31 28 4	23 317
302	302 15 35 1	62 031	19 43 24 2	13 616	347	348 2 29 3	55 455	5 8 9 4	23 398
303	303 17 37 0	61 857	19 29 47 1	13 970	348	348 57 56 6	55 393	4 44 45 5	23 472
304	304 19 28 4	61 678	19 15 48 9	14 317	349	349 53 20 2	55 335	4 21 17 2	23 538
305	305 21 9 1	61 500	19 1 29 9	14 655	350	350 48 40 4	55 283	3 57 44 9	23 600
306	306 22 39 1	61 318	18 46 50 6	14 990	351	351 43 57 4	55 235	3 34 8 9	23 655
307	307 23 58 2	61 138	18 31 51 2	15 318	352	352 39 11 5	55 193	3 10 29 6	23 705
308	308 25 6 5	60 958	18 16 32 1	15 642	353	353 34 23 1	55 150	2 46 47 3	23 747
309	309 26 4 0	60 773	18 0 53 6	15 958	354	354 29 32 5	55 120	2 23 2 5	23 785
310	310 26 50 4	60 593	17 44 56 1	16 268	355	355 24 40 0	55 098	1 59 15 4	23 815
311	311 27 26 0	60 578	17 28 40 0	16 575	356	356 19 45 9	55 078	1 35 26 5	23 838
312	312 27 50 7	60 228	17 12 5 5	16 873	357	357 14 50 6	55 060	1 11 36 2	23 858
313	313 28 4 4	60 048	16 55 13 1	17 167	358	358 9 54 2	55 052	0 47 44 7	23 868
314	314 28 7 3	59 868	16 38 3 1	17 453	359	359 4 57 3	55 045	0 23 52 6	23 877
315	315 27 59 4	59 687	16 20 35 9	17 733	360	360 0 0	55 045	0 0 0 0	23 877

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude

Lat	0	1 172	2, 178	3 177	4, 176	5 175	6, 174	7, 173	8, 172	9 171	10, 170
	180	181 359	182, 358	183 357	184 356	185, 355	186, 354	187 353	188 352	189 351	190 350
0°	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
1°	0 0	0 4	0 8	1 3	1 7	2 1	2 5	2 9	3 3	3 7	4 2
2°	0 0	0 8	1 7	2 5	3 3	4 2	5 0	5 8	6 7	7 5	8 3
3°	0 0	1 3	2 5	3 8	5 0	6 3	7 5	8 7	10 0	11 2	12 5
4°	0 0	1 7	3 3	5 0	6 7	8 3	10 0	11 7	13 3	15 0	16 7
5°	0 0	2 1	4 2	6 3	8 4	10 4	12 5	14 6	16 7	18 8	20 8
6°	0 0	2 5	5 0	7 5	10 0	12 5	15 0	17 5	20 0	22 5	25 0
7°	0 0	2 9	5 9	8 8	11 7	14 6	17 6	20 5	23 4	26 3	29 2
8°	0 0	3 3	6 7	10 1	13 4	16 8	20 1	23 5	26 8	30 1	33 5
9°	0 0	3 8	7 6	11 3	15 1	18 9	22 7	26 4	30 2	34 0	37 7
10°	0 0	4 2	8 4	12 6	16 8	21 0	25 2	29 4	33 6	37 8	42 0
11°	0 0	4 6	9 3	13 9	18 6	23 2	27 8	32 4	37 1	41 7	46 3
12°	0 0	5 1	10 1	15 2	20 3	25 4	30 4	35 5	40 5	45 6	50 6
13°	0 0	5 5	11 0	16 5	22 0	27 5	33 0	38 5	44 0	49 5	55 0
14°	0 0	6 0	11 9	17 9	23 8	29 7	35 7	41 6	47 5	53 5	59 4
15°	0 0	6 4	12 8	19 2	25 6	32 0	38 4	44 7	51 1	57 5	1 38
16°	0 0	6 8	13 7	20 5	27 4	34 2	41 0	47 9	54 7	1 15	8 3
17°	0 0	7 3	14 6	21 9	29 2	36 5	43 8	51 0	58 3	5 6	12 8
18°	0 0	7 8	15 5	23 3	31 0	38 8	46 5	54 2	1 20	9 7	17 4
19°	0 0	8 2	16 4	24 7	32 9	41 1	49 3	57 5	5 7	13 8	22 0
20°	0 0	8 7	17 4	26 1	34 7	43 4	52 1	1 08	9 4	18 1	26 7
21°	0 0	9 2	18 3	27 5	36 6	45 8	54 9	4 1	13 2	22 3	31 4
22°	0 0	9 6	19 3	28 9	38 6	48 2	57 8	7 4	17 0	26 6	36 2
23°	0 0	10 1	20 3	30 4	40 5	50 6	1 08	10 9	20 9	31 0	41 1
24°	0 0	10 6	21 3	31 9	42 5	53 1	3 7	14 3	24 9	35 5	46 0
25°	0 0	11 1	22 3	33 4	44 5	55 6	6 7	1 17 8	28 9	40 0	51 1
26°	0 0	11 6	23 3	34 9	46 6	58 2	9 8	21 4	33 0	44 6	56 2
27°	0 0	12 2	24 3	36 5	48 6	1 08	12 9	25 1	37 2	49 3	2 14
28°	0 0	12 7	25 4	38 1	50 8	3 4	16 1	28 8	41 4	54 0	6 6
29°	0 0	13 2	26 5	39 7	52 9	6 1	19 3	32 5	45 7	58 9	12 0
30°	0 0	13 8	27 6	41 3	55 2	8 9	22 6	36 4	50 1	2 38	17 5
31°	0 0	14 3	28 7	43 0	57 4	11 7	26 0	40 3	54 6	8 9	23 1
32°	0 0	14 9	29 8	44 8	59 7	14 6	29 4	44 3	59 2	14 0	28 8
33°	0 0	15 5	31 0	46 5	2 0	17 5	33 0	48 4	3 9	19 3	34 7

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	0	1, 179	2, 178	3, 177	4, 176	5, 175	6, 174	7, 173	8, 172	9, 171	10, 170
	180	181, 352	182, 358	183, 357	184, 356	185, 355	186, 354	187, 353	188, 352	189, 351	190, 350
34°	0' 0"	0' 16' 1"	0' 32' 2"	0' 48' 3"	1' 4' 4"	1' 20' 5"	1' 36' 6"	1' 52' 6"	2' 8' 7"	2' 24' 7"	2' 40' 7"
35	0 0	16 7	33 4	50 1	6 9	23 5	40 2	56 9	13 6	30 2	46 8
36	0 0	17 3	34 7	52 0	9 4	26 7	44 0	2 13	18 6	35 8	53 1
37	0 0	18 0	36 0	54 0	11 9	29 9	47 9	5 8	23 7	41 6	59 5
38	0 0	18 7	37 3	56 0	14 6	33 2	51 8	10 4	29 0	47 6	3 61
39	0 0	19 3	38 7	58 0	17 3	36 6	55 9	15 2	34 5	53 7	12 9
40	0 0	20 0	40 1	1 01	20 1	40 1	2 01	20 1	40 1	3 00	19 9
41	0 0	20 8	41 5	2 3	23 0	43 7	4 4	25 1	45 8	6 5	27 1
42	0 0	21 5	43 0	4 5	26 0	47 4	8 9	30 3	51 8	13 2	34 6
43	0 0	22 3	44 5	6 8	29 0	51 3	13 5	35 7	57 9	20 1	42 2
44	0 0	23 1	46 1	9 2	32 2	55 2	18 3	41 3	3 42	27 2	50 1
45	0 0	23 9	47 7	11 6	35 5	59 3	23 2	47 0	10 8	34 6	58 3
46	0 0	24 7	49 4	14 2	38 9	2 36	28 3	52 9	17 6	42 2	4 68
47	0 0	25 6	51 2	16 8	42 4	8 0	33 5	59 1	24 6	50 1	15 6
48	0 0	26 5	53 0	19 5	46 0	12 5	39 0	3 55	31 9	58 3	24 7
49	0 0	27 5	54 9	22 4	49 8	17 3	44 7	12 1	39 5	4 69	31 2
50	0 0	28 5	56 9	25 4	53 8	22 2	50 6	19 0	47 4	15 6	44 1
51	0 0	29 5	59 0	28 4	57 9	27 4	56 8	26 3	55 7	25 1	54 4
52	0 0	30 6	1 11	31 7	2 22	32 8	3 33	33 8	4 43	34 7	5 52
53	0 0	31 7	3 4	35 0	6 7	38 4	10 0	41 7	13 3	44 9	16 5
54	0 0	32 9	5 7	38 6	11 4	44 3	17 1	49 9	22 7	55 5	28 3
55	0 0	34 1	8 2	42 3	16 4	50 5	24 5	58 6	32 6	5 66	40 6
56	0 0	35 4	10 8	46 2	21 6	57 0	32 3	4 77	43 0	18 4	53 7
57	0 0	36 8	13 5	50 3	27 1	3 38	40 5	17 3	54 0	30 7	6 74
58	0 0	38 2	16 4	54 6	32 8	11 0	49 2	27 4	5 56	43 7	21 9
59	0 0	39 7	19 5	59 2	38 9	18 7	58 4	38 1	17 8	57 5	37 2
60	0 0	41 4	22 7	2 41	45 4	26 8	4 81	49 5	30 8	6 121	53 4
61	0 0	43 1	26 2	9 2	52 3	35 4	18 4	5 15	44 6	27 7	7 107
62	0 0	44 9	29 8	14 7	59 6	44 5	29 5	14 4	59 3	44 2	29 1
63	0 0	46 9	33 7	20 6	3 75	54 3	41 2	28 1	6 150	7 19	48 8
64	0 0	49 0	37 9	26 9	15 8	4 48	53 8	42 8	31 8	20 8	8 99
65	0 0	51 2	42 1	33 6	24 9	16 1	5 73	58 6	49 9	41 2	32 6
66	0 0	53 6	47 3	40 9	34 6	28 2	21 9	6 157	7 94	8 32	57 0
66° 23'	0 0	55 0	50 1	45 2	40 3	35 3	30 5	25 6	20 8	16 0	9 113



Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat.	11 162	12 168	13 167	14 165	15 165	16 164	17 163	18 162	19 161	20 160
	191 349	192 348	193 347	194 346	195 345	196 344	197 343	198 342	199 341	200 340
0	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"
1	46	50	54	58	62	66	70	74	78	82
2	91	100	108	116	124	132	141	149	157	165
3	137	150	162	174	187	199	211	223	235	248
4	183	200	216	233	249	265	282	298	314	330
5	229	250	270	291	311	332	352	373	393	413
6	275	300	325	349	374	399	423	448	472	496
7	321	350	379	408	437	466	494	523	552	580
8	368	401	434	467	500	533	566	599	1 31	1 64
9	415	452	489	527	564	1 01	1 38	1 75	111	148
10	462	503	545	586	1 28	69	110	151	192	233
11	509	555	1 01	1 46	92	137	183	228	273	318
12	556	1 07	57	107	157	206	256	306	355	404
13	1 04	59	113	168	222	276	330	384	437	491
14	53	112	170	229	288	346	404	462	520	578
15	102	165	228	291	354	417	479	542	2 04	2 66
16	151	218	286	354	421	488	555	2 22	88	155
17	200	273	345	417	488	560	2 31	103	174	244
18	251	327	404	481	557	2 33	109	184	260	335
19	302	383	464	545	2 26	107	187	267	347	427
20	353	439	525	2 10	96	181	256	351	435	520
21	405	496	586	77	166	257	346	436	525	3 14
22	458	554	2 49	144	239	333	428	522	3 16	109
23	511	2 12	112	212	311	411	510	3 09	108	206
24	566	71	176	281	385	490	594	98	201	304
25	2 21	131	241	351	461	570	3 79	187	296	404
26	77	192	307	422	537	3 51	165	279	392	505
27	134	255	375	495	3 15	134	253	372	490	4 08
28	192	318	444	569	94	218	343	467	590	113
29	252	383	513	3 44	174	304	434	563	4 92	221
30	312	448	585	121	256	392	527	4 62	196	330
31	374	516	3 57	199	340	481	4 22	162	303	441
32	436	584	132	279	426	572	119	255	418	555
33	501	3 54	208	361	513	4 66	218	359	538	8 109

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	11 169	12 168	13 167	14 166	15 165	16 164	17 163	18 162	19 161	20 160
	191 349	192 348	193 347	194 346	195 345	196 344	197 343	198 342	199 341	200 340
34°	2° 56 7	3° 12 6	3° 28 5	3° 44 4	4° 0 3	4 16 1	4° 31 9	4 47 7	5° 7 3	5 2 9
35	3 3 4	20 0	36 5	53 0	9 5	25 9	42 3	58 7	19 0	35 3
36	10 3	27 5	44 6	4 1 8	18 9	35 9	5° 9	5 9 9	31 1	47 9
37	17 4	35 2	53 0	10 8	28 5	46 2	5 3 9	21 5	43 4	6 0 9
38	24 7	43 1	4 1 6	20 0	38 4	56 8	15 1	33 3	56 1	14 2
39	32 1	51 3	10 4	29 5	48 6	5 7 6	26 6	45 5	6 9 1	27 9
40	39 8	59 7	19 5	39 3	59 1	18 8	38 5	58 1	22 6	42 1
41	47 7	4 8 3	28 9	49 4	5 9 9	30 3	50 7	6 11 0	31 3	51 5
42	55 9	17° 2	38 5	59 8	21 0	42 2	6 3 3	24 4	45 4	7 6 3
43	4 4 3	26 4	48 5	5 10 5	32 5	54 4	16 3	38 1	59 9	21 6
44	13 0	35 9	58 8	21 6	44 3	6 7 1	29 7	52 4	7 14 9	37 4
45	22 0	45 7	5 9 4	33 0	56 6	20 1	43 6	7 7 1	30 5	53 8
46	31 4	55 9	20 4	44 9	6 9 3	33 7	58 1	22 3	46 6	8 10 7
47	41 0	5 6 5	31 9	57 2	22 5	47 8	7 13 0	38 2	8 3 3	28 3
48	51 1	17 4	43 7	6 10 0	36 2	7 2 4	28 5	54 6	20 6	46 6
49	5 1 5	28 8	56 1	23 3	50 5	17 6	44 7	8 11 7	38 7	9 5 6
50	12 4	40 7	6 8 9	37 1	7 5 3	33 4	8 1 5	29 5	57 5	25 4
51	23 8	53 1	22 4	51 6	20 8	50 0	19 1	48 2	9 17 1	46 1
52	35 6	6 6 0	36 4	7 6 7	37 0	8 7 2	37 4	9 7 5	37 6	10 7 7
53	48 0	19 5	51 0	22 5	53 9	25 3	56 6	27 9	59 1	30 3
54	6 1 0	33 7	7 6 4	39 0	8 11 6	44 2	9 16 7	49 2	10 21 6	54 0
55	14 6	48 6	22 5	56 4	30 2	9 4 1	37 9	10 11 6	45 3	11 18 9
56	29 0	7 4 2	39 5	8 14 7	49 8	25 0	10 0 1	35 2	11 10 2	45 1
57	44 1	20 7	57 3	33 9	9 10 5	47 0	23 5	11 0 0	36 4	12 12 8
58	7 0 0	38 1	8 16 2	54 3	32 3	10 10 3	48 3	26 3	12 4 2	42 1
59	16 9	56 5	36 2	9 15 8	55 4	35 0	11 14 5	54 1	33 6	13 13 0
60	34 8	8 16 1	57 4	38 6	10 19 9	11 1 2	42 4	12 23 6	13 4 8	46 0
61	53 8	36 8	9 19 9	10 2 9	46 0	29 0	12 12 0	55 0	39 0	14 21 0
62	8 14 1	59 0	43 9	28 9	11 13 8	58 7	43 7	13 28 6	14 13 5	58 4
63	35 7	9 22 7	10 9 6	56 6	43 5	12 30 5	13 17 5	14 4 5	51 5	15 38 5
64	59 0	48 0	37 2	11 26 3	12 15 4	13 4 6	53 8	43 1	15 32 3	16 21 6
65	9 23 9	10 15 3	11 6 8	58 3	49 8	41 4	14 33 0	15 24 6	16 16 3	17 8 1
66	50 9	44 8	38 8	12 32 8	13 26 9	14 21 1	15 15 3	16 9 6	17 3 9	58 4
66° 23'	10 6 7	11 2 1	57 5	53 0	48 6	44 3	40 1	35 9	31 8	18 27 9

Table III—Ascensional Difference of every 1° ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	21, 15'	22 15'	23 15'	24 15'	25 15'	26, 15'	27, 15'	28 15'	29 15'	30 15'
	201 339	202 338	203 337	204 336	205 335	206 334	207 333	208 332	209 331	210 330
0	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"
1	8 6	9 0	9 4	9 8	10 2	10 6	11 0	11 4	11 8	12 2
2	17 3	18 1	18 9	19 7	20 5	21 3	22 1	22 8	23 6	24 4
3	26 0	27 2	28 4	29 6	30 7	31 9	33 1	31 3	35 1	36 6
4	34 6	36 2	37 8	39 4	41 0	42 6	44 2	45 7	47 3	48 8
5	43 3	43 3	47 3	49 3	51 3	53 3	55 2	57 2	59 2	1 1 1
6	52 1	54 5	56 9	59 3	1 1 6	1 4 0	1 6 4	1 8 7	1 11 0	13 4
7	1 0 8	1 3 6	1 6 4	1 9 2	12 0	14 8	17 5	20 3	23 0	25 7
8	9 6	12 8	16 1	19 3	22 4	25 6	28 8	31 9	35 0	38 1
9	18 5	22 1	25 7	29 3	32 9	36 5	40 0	43 6	47 1	50 6
10	27 3	31 4	35 4	39 4	43 4	47 4	51 4	55 3	59 2	2 3 1
11	36 3	40 8	45 2	49 6	54 0	58 4	2 2 8	2 7 1	2 11 4	15 7
12	45 3	50 2	55 0	59 9	2 4 7	2 9 5	14 3	19 0	23 7	28 4
13	54 4	59 7	2 5 0	2 10 2	15 4	20 6	25 8	31 0	36 1	41 2
14	2 3 5	2 9 2	15 0	20 6	26 3	31 9	37 5	43 1	48 6	54 1
15	12 8	18 9	25 0	31 1	37 2	43 3	49 3	55 3	3 1 2	3 7 1
16	22 1	28 7	35 2	41 7	48 2	54 7	3 1 2	3 7 6	13 9	20 3
17	31 5	38 5	45 5	52 5	59 4	3 7 3	13 2	20 0	26 8	33 5
18	41 0	48 5	55 9	3 3 3	3 10 7	18 0	25 3	32 6	39 8	47 0
19	50 6	58 5	3 6 4	14 3	22 1	29 8	37 6	45 3	52 9	4 0 5
20	3 0 4	3 8 7	17 1	25 4	33 6	41 8	50 0	58 1	4 6 2	14 3
21	10 2	19 1	27 8	36 6	45 3	54 0	4 2 6	4 11 2	19 7	28 2
22	20 2	29 5	38 8	48 0	57 2	4 6 3	15 4	24 4	33 4	42 3
23	30 4	40 1	49 9	59 5	4 9 2	18 8	28 3	37 8	47 3	56 6
24	40 7	50 9	4 1 1	4 11 3	21 4	31 4	41 5	51 4	5 1 3	5 11 2
25	51 1	4 1 9	12 6	23 2	33 8	44 3	54 8	5 5 3	15 6	26 0
26	4 1 8	13 0	24 2	35 3	46 4	57 4	5 8 4	19 3	30 2	41 0
27	12 6	24 3	36 0	47 6	59 2	5 10 8	22 2	33 6	45 0	56 3
28	23 6	35 9	48 1	5 0 2	5 12 3	24 3	36 3	48 2	6 0 1	6 11 8
29	34 9	47 6	5 0 3	13 0	25 6	38 1	50 6	6 3 1	15 4	27 7
30	46 3	59 6	12 8	26 0	39 2	52 3	6 5 3	18 2	31 1	43 9
31	58 0	5 11 8	25 6	39 4	53 0	6 6 6	20 2	33 7	47 1	7 0 4
32	5 9 9	24 3	38 7	53 0	6 7 2	21 4	35 5	49 5	7 3 4	17 3
33	25 9	40 8	55 7	6 10 6	25 4	40 1	54 7	7 9 3	23 8	38 2

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	21 159	22 158	23 157	24 156	25 155	26 154	27 153	28 152	29 151	30 150
	201 339	202 338	203 337	204 336	205 335	206 334	207 333	208 332	209 331	210 330
34	5 38 5	5 54 1	6 9 5	6 25 0	6 40 3	6 55 6	7 10 8	7 26 0	7 41 0	7 56 0
35	51 5	6 7 6	23 7	39 7	55 6	7 11 5	27 3	43 1	58 7	8 14 3
36	6 4 7	21 5	38 2	54 8	7 11 4	27 8	44 3	8 0 6	8 16 8	33 0
37	18 3	35 7	53 0	7 10 3	27 5	44 6	8 1 6	18 6	35 4	52 2
38	32 3	50 4	7 8 3	26 2	44 1	8 1 8	19 5	37 1	54 6	9 12 0
39	46 7	7 5 4	24 0	42 6	8 1 1	19 5	37 8	56 1	9 14 2	32 3
40	7 1 5	20 9	40 2	59 5	18 6	37 7	56 7	9 15 7	34 5	53 2
41	11 7	31 8	51 9	8 11 8	31 8	51 6	9 11 3	30 9	50 5	10 9 9
42	27 3	48 1	8 8 9	29 6	50 2	9 10 7	31 2	51 6	10 11 8	32 0
43	43 3	8 4 9	26 4	47 9	9 9 3	30 6	51 8	10 12 9	33 9	54 8
44	59 9	22 3	44 6	9 6 8	29 0	51 1	10 13 0	34 9	56 7	11 18 4
45	8 17 1	40 3	9 3 4	26 4	49 4	10 12 3	35 1	57 8	11 20 4	42 9
46	34 8	58 9	22 9	46 7	10 10 6	34 3	57 9	11 21 5	44 9	12 8 2
47	53 3	9 18 2	43 1	10 7 8	32 5	57 1	11 21 6	46 0	12 10 3	34 5
48	9 12 5	38 3	10 4 1	29 8	55 4	11 20 9	46 3	12 11 6	36 8	13 1 9
49	32 5	59 2	25 9	57 6	11 19 1	45 6	12 11 9	38 2	13 4 4	30 4
50	53 2	10 21 0	48 7	11 16 3	43 9	12 11 3	38 7	13 6 0	33 1	14 0 2
51	10 15 0	43 8	11 12 5	41 2	12 9 8	38 2	13 6 6	35 0	14 3 1	31 2
52	37 6	11 7 5	37 4	12 7 1	36 8	13 6 4	35 9	14 5 3	34 6	15 3 7
53	11 1 4	32 4	12 3 4	34 3	13 5 1	35 9	14 6 5	37 1	15 7 5	37 8
54	26 3	58 6	30 7	13 2 8	34 9	14 6 8	38 7	15 10 4	42 1	16 13 7
55	52 5	12 26 0	59 5	32 8	14 6 1	39 4	15 12 5	45 6	16 18 5	51 3
56	12 20 1	54 9	13 29 7	14 4 4	39 1	15 13 7	48 2	16 27 6	56 9	17 31 1
57	49 1	13 25 4	14 1 6	37 8	15 13 9	49 9	16 25 8	17 1 7	17 37 5	18 13 1
58	13 19 9	57 7	35 4	15 13 1	50 7	16 28 2	17 5 7	43 1	18 20 4	57 7
59	52 5	14 31 9	15 11 2	50 5	16 29 7	17 8 9	48 0	18 27 1	19 6 1	19 44 9
60	14 27 1	15 8 2	49 3	16 30 3	17 11 3	52 2	18 33 1	19 13 9	54 7	20 35 4
61	15 4 0	46 9	16 29 8	17 12 7	55 6	18 38 4	19 21 2	20 3 9	20 46 6	21 29 2
62	43 4	16 28 3	17 13 2	58 1	18 42 9	19 27 8	20 12 6	57 4	21 42 2	22 26 9
63	16 25 6	17 12 6	59 7	18 46 7	19 33 8	20 20 8	21 7 9	21 54 9	22 42 0	23 29 0
64	17 11 0	18 0 3	18 49 7	19 39 1	20 28 5	21 18 0	22 7 5	22 57 0	23 46 5	24 36 0
65	59 9	51 8	19 43 7	20 35 7	21 27 7	22 19 8	23 11 9	24 4 1	24 56 4	25 48 7
66	18 52 9	19 47 5	20 42 2	21 37 0	22 31 9	23 26 9	24 22 0	25 17 2	26 12 5	27 7 8
66 33	19 24 0	20 20 3	21 16 6	22 13 1	23 9 7	24 6 4	25 3 2	26 0 2	57 3	54 5

Table III—Ascensional Difference of every Ecliptic Degree at every  
Degree of Terrestrial Latitude—(Contd)

Lat	31 147	32 148	33 147	34 146	35 145	36 144	37 143	38 142	39 141	40 140
	211 329 212	328 213	327 214	326 215	325 216	324 217	323 218	322 219	321 220	320
0°	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"
1	12 6	12 9	13 3	13 7	14 1	14 4	14 8	15 2	15 5	15 9
2	25 1	25 9	26 7	27 4	28 1	28 9	29 6	30 3	31 1	31 8
3	37 7	38 9	40 0	41 1	42 2	43 3	44 4	45 5	46 6	47 7
4	50 3	51 9	53 4	54 9	56 4	57 8	59 3	1 0 8	1 2 2	1 3 6
5	1 3 0	1 4 9	1 6 8	1 8 7	1 10 5	1 12 4	1 14 2	16 0	17 8	19 6
6	15 7	18 0	20 2	22 5	24 7	26 9	29 1	31 3	33 5	35 6
7	28 4	31 1	33 7	36 4	39 0	41 6	44 1	46 7	49 2	51 7
8	41 2	44 2	47 3	50 3	53 3	56 3	59 2	2 2 1	2 5 0	2 7 9
9	54 0	57 5	2 0 9	2 4 3	2 7 7	2 11 0	2 14 3	17 6	20 9	24 1
10	2 7 0	2 10 5	14 6	18 4	22 2	25 9	29 6	33 2	36 9	40 4
11	20 0	24 2	28 4	32 6	36 7	40 8	44 9	48 9	52 9	56 9
12	33 1	37 7	42 3	46 9	51 4	55 9	3 0 3	3 4 7	3 9 1	3 13 4
13	46 3	51 3	56 3	3 1 2	3 6 2	3 11 0	15 9	20 7	25 4	30 1
14	59 6	3 5 0	3 10 4	15 7	21 1	26 3	31 6	36 7	41 9	47 0
15	3 13 0	18 8	24 6	30 4	36 1	41 8	47 4	53 0	58 5	4 3 9
16	26 5	32 8	39 0	45 2	51 3	57 3	4 3 4	4 9 3	4 15 2	21 1
17	40 2	46 9	53 5	4 0 1	4 6 6	4 13 1	19 5	25 9	32 2	38 4
18	54 1	4 1 2	4 8 2	15 2	22 1	29 0	35 8	42 6	49 3	55 9
19	4 8 1	15 6	23 1	30 5	37 8	45 1	52 3	59 5	5 6 6	5 13 6
20	22 3	30 2	38 1	45 9	53 7	5 1 4	5 9 1	5 16 6	24 2	31 6
21	36 6	45 0	53 3	5 1 6	5 9 8	17 9	26 0	34 0	41 9	49 8
22	51 2	5 0 0	5 8 8	17 5	26 1	34 7	43 2	51 6	59 9	6 8 2
23	5 6 0	15 2	24 5	33 6	42 7	51 7	6 0 6	6 9 5	6 18 2	26 9
24	21 0	30 7	40 4	50 0	59 5	6 8 9	18 3	27 6	36 8	45 9
25	36 2	46 4	56 5	6 6 6	6 16 6	26 5	36 3	46 0	55 7	7 5 2
26	51 7	6 2 4	6 13 0	23 5	34 0	44 3	54 6	7 4 8	7 14 9	24 9
27	6 7 5	18 6	29 7	40 7	51 6	7 2 5	7 13 2	23 9	34 4	44 9
28	23 6	35 2	46 8	58 3	7 9 7	21 0	32 2	43 3	54 3	8 5 3
29	39 9	52 1	7 4 1	7 16 1	28 0	39 8	51 5	8 3 1	8 14 6	26 0
30	56 6	7 9 3	21 9	34 4	46 8	59 1	8 11 3	23 4	35 4	47 2
31	7 13 7	26 9	40 0	53 0	8 5 9	8 18 7	31 4	44 0	56 5	9 8 9
32	31 1	44 8	58 5	8 12 0	25 4	38 8	52 0	9 5 1	9 18 1	31 0
33	52 5	8 3 2	8 17 4	31 5	45 4	59 3	9 13 1	26 7	40 3	53 7

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	31, 149	32 148	33 147	34 146	35 145	36 144	37, 143	38 142	39 141	40 140
	211 329	212 328	213 327	214 326	215 325	216 324	217 323	218 322	219 321	220 320
34	8° 10 9	8° 22 0	8° 36 8	8 51 4	9° 5 9	9° 20 3	9° 34 6	9° 48 8	10 2 9	10° 16 9
35	29 7	41 3	56 6	9 11 8	26 9	41 9	56 8	10 11 5	26 1	40 6
36	49 1	9 1 1	9 17 0	32 7	48 4	10 4 0	10 19 4	34 8	50 0	11 5 0
37	9 8 9	21 4	37 9	54 3	10 10 5	26 7	42 7	58 7	11 14 4	30 1
38	29 3	42 2	59 3	10 16 4	33 3	50 0	11 6 7	11 23 2	39 6	55 8
39	50 3	10 3 7	10 21 4	39 1	56 6	11 14 1	31 3	48 5	12 5 5	12 22 4
40	10 11 9	25 8	44 2	11 2 5	11 20 7	38 8	56 7	12 14 5	32 2	49 7
41	29 3	48 5	11 7 7	26 7	45 5	12 4 3	12 22 9	41 4	59 7	13 17 9
42	52 1	11 12 0	31 9	51 6	12 11 2	30 6	50 0	13 9 1	13 28 1	47 0
43	11 15 6	36 3	56 9	12 17 4	37 7	57 9	13 17 9	37 8	57 5	14 17 1
44	40 0	12 1 5	12 22 8	44 0	13 5 1	13 26 0	46 8	14 7 5	14 28 0	48 3
45	12 5 2	27 5	49 6	13 11 7	33 5	55 3	14 16 8	38 3	59 5	15 20 6
46	31 4	54 5	13 17 5	40 3	14 3 0	14 25 6	48 0	15 10 2	15 32 3	54 1
47	58 6	13 22 6	46 4	14 10 1	33 7	57 1	15 20 3	43 4	16 6 3	16 29 0
48	13 26 9	51 8	14 16 5	41 1	15 5 5	15 29 8	54 0	16 18 0	41 8	17 5 1
49	56 4	14 22 2	47 8	15 13 4	38 8	16 4 0	16 29 1	54 0	17 18 7	43 3
50	14 27 1	53 9	15 20 5	47 1	16 13 5	39 7	17 5 7	17 31 6	57 3	18 22 9
51	59 2	15 27 0	54 7	16 22 3	49 7	17 17 0	44 1	18 11 0	18 37 8	19 4 3
52	15 32 8	16 1 7	16 30 5	59 2	17 7 7	56 1	18 24 3	52 3	19 20 1	47 8
53	16 8 1	38 1	17 8 1	17 37 9	18 7 6	18 37 1	19 6 5	19 35 6	20 4 6	20 33 4
54	45 1	17 16 4	47 6	18 18 6	49 5	19 20 3	50 8	20 21 2	51 4	21 21 5
55	17 24 1	56 7	18 29 2	19 1 5	19 33 7	20 5 7	20 37 6	21 9 3	21 40 8	22 12 2
56	18 5 2	18 39 2	19 13 0	46 8	20 20 3	53 8	21 27 1	22 0 2	22 33 1	23 5 8
57	48 7	19 24 1	59 5	20 34 7	21 9 7	21 44 7	22 19 4	54 0	23 28 4	24 2 7
58	19 34 8	20 11 8	20 48 7	21 25 5	22 2 2	22 38 7	23 15 0	23 51 2	24 27 3	25 3 1
59	20 23 8	21 2 5	21 41 1	22 19 6	57 9	23 36 2	24 14 3	24 52 2	25 30 0	26 7 6
60	21 16 0	56 5	22 36 9	23 17 3	23 57 5	24 37 6	25 17 6	25 57 4	26 37 1	27 16 6
61	22 11 8	22 54 3	23 36 7	24 19 0	25 1 2	25 43 4	26 25 4	27 7 3	27 49 1	28 30 7
62	23 11 6	23 56 2	24 40 8	25 25 3	26 9 8	26 54 1	27 38 4	28 22 6	29 6 7	29 50 6
63	24 16 0	25 3 0	25 49 9	26 36 8	27 23 7	28 10 5	28 57 3	29 44 0	30 30 6	31 17 1
64	25 25 5	26 15 1	27 4 7	27 54 2	28 43 8	29 33 3	30 22 9	31 12 4	32 1 8	32 51 3
65	26 41 0	27 33 5	28 25 9	29 18 4	30 11 0	31 3 6	31 56 2	32 48 9	33 41 6	34 34 3
66	28 3 3	28 58 9	29 54 7	30 50 5	31 46 4	32 42 5	33 38 6	34 34 9	35 31 3	36 27 8
66° 33'	51 9	29 49 4	30 47 1	31 45 0	32 42 9	33 41 1	34 39 4	35 37 9	36 35 5	37 35 3

Table III—Astensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	41 139	42 138	43 137	44 136	45 135	46 134	47 133	48 132	49 131	50 130
	221 319	222 318	223 317	224 316	225 315	226 314	227 313	228 312	229 311	230 310
0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
1	16 2	16 6	16 9	17 3	17 6	17 9	18 3	18 6	18 9	19 2
2	32 5	33 2	33 9	34 5	35 2	35 9	36 5	37 2	37 8	38 4
3	48 7	49 8	50 8	51 8	52 8	53 8	54 8	55 8	56 7	57 7
4	1 5 0	1 6 4	1 7 8	1 9 2	1 10 5	1 11 8	1 13 1	1 14 4	1 15 7	1 17 0
5	21 4	23 1	24 8	26 5	28 2	29 9	31 5	33 1	34 7	36 3
6	37 7	39 8	41 9	43 9	46 0	1 48 0	49 9	51 9	53 8	55 7
7	54 2	56 6	59 0	2 1 4	2 3 8	2 6 1	2 8 4	2 10 7	2 12 9	2 15 1
8	2 10 7	2 13 5	2 16 3	19 0	21 7	24 4	27 0	29 6	32 2	34 7
9	27 3	30 5	33 6	36 7	39 7	42 7	45 7	48 6	51 5	54 4
10	44 0	47 5	51 0	54 4	57 8	3 1 2	3 4 5	3 7 8	3 11 0	3 14 1
11	3 0 8	3 4 7	3 8 5	3 12 3	3 16 1	19 8	23 4	27 0	30 5	34 0
12	17 7	22 0	26 2	30 3	34 4	38 5	42 4	46 4	50 3	54 1
13	34 8	39 4	44 0	48 5	52 9	57 3	4 1 6	4 5 9	4 10 1	4 14 3
14	52 0	57 0	4 1 9	4 6 8	4 11 6	4 16 3	21 0	25 6	30 2	34 6
15	4 9 3	4 14 7	20 0	25 2	30 4	35 5	40 5	45 5	50 4	55 2
16	26 9	32 6	38 3	43 9	49 4	54 9	5 0 3	5 5 6	5 10 8	5 16 0
17	44 6	50 7	56 7	5 2 7	5 8 6	5 14 4	20 2	25 9	31 5	37 0
18	5 2 5	5 9 0	5 15 4	21 8	28 0	34 3	40 4	46 4	52 3	58 2
19	20 6	27 5	34 3	41 1	47 7	54 3	6 0 8	6 7 2	6 13 5	6 19 7
20	39 0	46 2	53 5	6 0 6	6 7 6	6 14 6	21 4	28 2	34 8	41 4
21	57 5	6 5 2	6 12 8	20 4	27 8	35 1	42 4	49 5	56 5	7 3 5
22	6 16 4	24 5	32 5	40 4	48 3	56 0	7 3 6	7 11 1	7 18 5	25 8
23	35 5	44 0	52 5	7 0 8	7 9 0	7 17 1	25 2	33 1	40 9	48 5
24	55 0	7 3 9	7 12 7	21 5	30 1	38 6	47 1	55 4	8 3 5	8 11 6
25	7 14 7	24 1	33 3	42 5	51 6	8 0 5	8 9 3	8 18 0	26 6	35 0
26	34 8	44 6	54 3	8 3 9	8 13 4	22 7	32 0	41 1	50 0	58 9
27	55 3	8 5 5	8 15 6	25 7	35 6	45 4	55 0	9 4 5	9 13 9	9 23 2
28	8 16 1	26 8	37 4	47 9	58 2	9 8 4	9 18 5	28 5	38 3	47 9
29	37 3	48 5	59 6	9 10 5	9 21 3	31 9	42 5	52 9	10 3 1	10 13 2
30	59 0	9 10 7	9 22 2	33 6	44 8	56 0	10 6 9	10 17 8	28 4	39 0
31	9 21 1	33 3	45 3	57 2	10 8 9	10 20 5	31 9	43 2	54 3	11 5 3
32	43 8	56 4	10 8 9	10 21 3	33 5	45 6	57 5	11 9 2	11 20 8	32 3
33	10 6 9	10 20 1	33 1	46 0	58 7	11 11 2	11 23 6	35 9	47 9	57 8

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd.)

Lat.	41, 139	42, 138	43, 137	44, 136	45, 135	46, 134	47, 133	48, 132	49, 131	50, 130										
	221	316	222	318	223	317	224	316	225	315	226	314	227	313	228	312	229	311	230	310
34°	10 30 7	10 44 3	10 57 9	11° 11 3	11 24 5	11° 37 6	11° 50 4	12 3 2	12° 15 7	12 28 6										
35	55 0	11 9 2	11 23 3	37 2	50 9	12 4 5	12 17 9	31 2	44 2	57 1										
36	11 19 9	34 7	49 3	12 3 8	12 18 1	32 2	46 1	59 9	13 13 5	13 26 8										
37	45 6	12 0 9	12 16 1	31 1	46 0	13 0 6	13 15 1	13 29 4	43 5	57 4										
38	12 11 9	27 9	43 6	59 2	13 14 7	29 9	45 0	59 8	14 14 5	14 28 9										
39	39 1	55 6	13 12 0	13 28 2	44 2	14 0 0	14 15 7	14 31 1	46 3	15 1 3										
40	13 7 0	13 24 2	41 2	58 0	14 14 7	31 1	47 3	15 3 4	15 19 2	34 8										
41	35 9	53 7	14 11 4	14 28 8	46 1	15 3 2	15 20 0	36 7	53 1	16 9 3										
42	14 5 7	14 24 2	42 5	15 0 6	15 18 6	36 3	53 8	16 11 1	16 28 2	45 0										
43	36 5	55 7	15 14 7	33 6	52 2	16 10 6	16 28 8	46 8	17 4 5	17 22 0										
44	15 8 4	15 28 3	48 1	16 7 7	16 27 0	46 1	17 5 0	17 23 7	42 1	18 0 3										
45	41 5	16 2 2	16 22 7	43 0	17 3 1	17 23 0	42 6	18 2 0	18 21 2	40 1										
46	16 15 9	37 4	58 7	17 19 8	40 7	18 1 3	18 21 7	41 9	19 1 8	19 21 4										
47	51 6	17 14 0	17 36 1	58 0	18 19 7	41 2	19 2 4	19 23 4	44 1	20 4 5										
48	17 28 8	52 0	18 15 0	18 37 8	19 0 4	19 22 7	44 8	20 6 6	20 23 1	49 4										
49	18 7 6	18 31 8	55 7	19 19 4	42 9	20 6 1	20 29 1	51 8	21 14 2	21 36 3										
50	48 2	19 13 3	19 38 2	20 2 8	20 27 3	51 5	21 15 4	21 39 0	22 2 4	22 25 4										
51	19 30 7	56 8	20 22 7	48 4	21 13 8	21 39 0	22 3 9	22 28 6	52 9	23 17 0										
52	20 15 2	20 42 4	21 9 4	21 36 2	22 2 7	22 28 9	54 9	23 20 6	23 46 0	24 11 1										
53	21 2 0	21 30 4	58 5	22 26 4	54 1	23 21 5	23 48 6	24 15 4	24 41 9	25 8 1										
54	51 3	22 20 9	22 50 2	23 19 4	23 48 3	24 16 9	24 45 2	25 13 2	25 41 0	26 8 4										
55	22 43 3	23 14 2	23 44 9	24 15 3	24 45 5	25 15 4	25 45 0	26 14 4	26 43 4	27 12 1										
56	23 38 3	24 10 6	24 42 7	25 14 6	25 46 2	26 17 5	26 48 5	27 19 2	27 49 7	28 19 8										
57	24 36 7	25 10 5	25 44 1	26 17 5	26 50 6	27 23 4	27 56 0	28 28 3	29 0 2	29 31 8										
58	25 38 8	26 14 3	26 49 5	27 24 5	27 59 3	28 33 8	29 8 0	29 41 9	30 15 5	30 48 8										
59	26 45 1	27 22 3	27 59 3	28 36 1	29 12 7	29 49 0	30 25 0	31 0 8	31 36 2	32 11 3										
60	27 56 0	28 35 2	29 14 7	29 52 9	30 31 5	31 9 8	31 47 8	32 25 6	33 3 0	33 40 2										
61	29 12 2	29 53 6	30 34 7	31 15 6	31 56 4	32 36 9	33 17 1	33 57 1	34 36 8	35 16 3										
62	30 34 5	31 18 2	32 1 7	32 45 0	33 28 2	34 11 2	34 54 0	35 36 5	36 18 7	37 0 7										
63	32 3 6	32 49 9	33 36 1	34 22 2	35 8 2	35 53 9	36 39 5	37 24 9	38 10 1	38 55 0										
64	33 40 7	34 30 0	35 19 2	36 8 4	36 57 5	37 46 5	38 35 3	39 24 0	40 12 6	41 0 9										
65	35 27 0	36 19 8	37 12 5	38 5 2	38 58 0	39 50 6	40 43 3	41 35 9	42 28 4	43 20 8										
66	37 24 4	38 21 1	39 17 8	40 14 7	41 11 7	42 8 8	43 6 0	44 3 2	45 0 5	45 57 9										
66° 33'	38 34 3	39 33 5	40 32 8	41 32 3	42 32 0	43 31 9	44 31 9	45 32 2	46 32 6	47 33 2										



Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	51	129	52	125	53	124	54	126	55	125	56	124	57	123	58	122	59	121	60	120
	231	309	237	308	233	307	234	306	235	305	236	304	237	303	238	302	239	301	240	300
0	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"	0° 0' 0"
1	19 5		19 8		20 1		20 4		20 7		21 0		21 2		21 5		21 8		22 0	
2	39 0		39 6		40 2		40 8		41 4		42 0		42 5		43 0		43 6		44 1	
3	58 6		59 5		1 0 4		1 1 3		2 1		1 3 0		1 3 8		1 4 6		1 5 4		1 6 1	
4	1 18 2		1 19 4		20 6		21 8		22 9		24 0		25 1		26 2		27 2		28 3	
5	37 8		39 3		40 8		42 3		43 7		45 1		46 5		47 8		49 2		50 4	
6	57 5		59 3		2 1 1		2 2 9		2 4 6		2 6 3		2 8 0		2 9 6		2 11 1		2 12 7	
7	2 17 3		2 19 4		21 5		23 6		25 6		27 6		29 5		31 4		33 2		35 0	
8	37 2		39 6		2 42 0		44 4		46 7		48 9		51 1		53 3		55 4		57 5	
9	57 1		59 9		3 2 6		3 5 2		3 7 8		3 10 4		3 12 9		3 15 3		3 17 7		3 20 0	
10	3 17 2		3 20 3		23 3		26 3		29 1		32 0		34 8		37 5		40 1		42 7	
11	37 5		40 8		44 1		47 4		50 6		53 7		56 8		59 8		4 2 7		4 5 5	
12	57 8		4 1 5		4 5 1		4 8 7		4 12 2		4 15 6		4 19 0		4 22 2		25 4		28 5	
13	4 18 4		22 4		26 3		30 2		34 0		37 7		41 3		44 9		48 3		51 7	
14	39 1		43 4		47 6		51 8		55 9		59 9		5 3 9		5 7 7		5 11 5		5 15 1	
15	59 9		5 4 6		5 9 2		5 13 7		5 18 1		5 22 4		26 6		30 8		34 8		38 7	
16	5 21 0		26 0		30 9		35 7		40 5		45 1		49 6		54 0		58 4		6 3 6	
17	4 4		47 7		52 9		58 1		6 3 1		6 8 0		6 17 8		6 17 6		6 22 2		26 7	
18	6 3 9		6 9 6		6 15 7		6 20 6		26 0		31 2		36 3		41 4		46 3		51 1	
19	25 8		31 8		37 6		43 4		49 1		54 7		0 1		7 5 5		7 10 7		7 15 7	
20	47 9		54 2		7 0 5		7 6 6		7 12 6		7 18 4		24 2		29 9		35 4		40 7	
21	7 10 3		7 17 0		23 6		30 0		36 4		42 6		48 7		54 6		8 0 4		8 6 1	
22	33 0		40 1		47 0		53 8		8 0 5		8 7 0		8 13 4		8 19 7		25 8		31 8	
23	56 1		8 3 5		8 10 8		8 18 0		25 0		31 9		38 6		45 2		51 6		57 9	
24	8 19 5		27 3		35 0		42 5		49 9		57 1		9 4 2		9 11 1		9 17 9		9 24 4	
25	43 3		51 5		59 5		9 7 4		9 15 2		9 22 7		30 2		37 4		44 5		51 4	
26	9 7 6		9 16 1		9 24 6		37 8		40 9		48 9		56 6		10 4 2		10 11 7		10 18 9	
27	32 3		41 2		50 0		58 7		10 7 1		10 15 4		10 23 6		31 5		39 3		46 9	
28	57 4		10 6 8		10 16 0		10 25 0		33 9		42 5		51 0		59 4		11 7 5		11 15 4	
29	10 23 1		32 9		42 5		51 9		11 1 1		11 10 2		11 19 1		11 27 8		36 2		44 3	
30	49 3		57 5		11 9 5		11 19 3		29 0		38 4		47 7		56 8		12 5 6		12 14 2	
31	11 16 1		11 26 7		37 1		47 4		57 4		12 7 3		12 17 0		12 26 4		35 6		44 6	
32	43 5		54 5		12 5 4		12 16 1		12 26 6		36 8		46 9		56 7		13 6 3		13 15 7	
33	12 11 5		12 23 0		34 4		12 45 5		56 4		13 7 1		13 17 5		13 27 8		37 8		47 6	

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	51, 129	52, 128	53, 127	54, 126	55, 125	56, 124	57, 123	58, 122	59, 121	60, 120										
	231	307	232	308	233	307	234	306	235	305	236	304	237	303	238	302	239	301	240	300
34°	12° 40 3	12° 52 2	13° 4 0	13 15 6	13° 26 9	13° 38 1	13° 49 0	13° 51 6	14° 10 1	14° 20 2										
35	13 9 7	13 22 2	34 5	46 5	58 3	14 9 9	14 21 2	14 32 3	43 2	53 8										
36	40 0	53 0	14 5 7	14 18 2	14 30 5	42 6	54 3	15 5 3	15 17 2	15 28 2										
37	14 11 1	14 24 6	37 8	50 9	15 3 6	15 16 1	15 28 4	40 4	52 2	16 3 6										
38	43 1	57 1	15 10 9	15 24 4	37 7	50 7	16 3 5	16 16 0	16 28 2	40 1										
39	15 16 1	15 30 7	45 0	59 0	16 12 8	16 26 4	39 6	52 6	17 5 3	17 17 7										
40	50 1	16 5 3	16 20 1	16 34 7	49 1	17 3 2	17 16 9	17 30 4	43 6	56 5										
41	16 23 3	41 0	56 4	17 11 6	17 26 5	41 2	55 5	18 9 5	18 23 2	18 36 6										
42	17 1 6	17 17 9	17 34 0	49 8	18 5 3	18 20 5	18 35 4	50 0	19 4 2	19 18 2										
43	39 2	56 2	18 12 9	18 29 3	45 4	19 1 2	19 16 7	19 31 9	46 7	20 1 2										
44	18 18 2	18 35 8	53 2	19 10 2	19 27 0	43 4	59 6	20 15 3	20 30 8	45 9										
45	58 7	19 17 0	19 35 1	52 8	20 10 2	20 27 3	20 44 1	21 0 5	21 16 6	21 32 3										
46	19 40 8	59 9	20 18 6	20 37 1	55 2	21 13 0	21 30 5	47 6	22 4 3	22 20 6										
47	20 24 6	20 44 5	21 4 0	21 23 2	21 42 1	22 0 6	22 18 8	22 36 6	54 0	23 11 1										
48	21 10 4	21 31 0	51 4	22 11 4	22 31 0	50 3	23 9 3	23 27 8	23 46 0	24 3 8										
49	58 2	22 19 7	22 40 9	23 1 7	23 22 2	23 42 3	24 2 1	24 21 4	24 40 4	53 9										
50	22 48 2	23 10 6	23 32 7	54 4	24 15 8	24 36 8	57 4	25 17 6	25 37 4	25 56 8										
51	23 40 7	24 4 1	24 27 1	24 49 8	25 12 1	25 34 0	25 55 6	26 16 7	26 37 3	26 57 6										
52	24 35 9	25 0 3	25 24 4	25 48 1	26 11 4	26 34 3	26 56 8	27 18 9	27 40 5	28 1 7										
53	25 34 0	59 5	26 24 7	26 49 5	27 13 9	27 37 9	28 1 4	28 24 5	28 47 2	29 9 4										
54	56 35 4	27 2 1	27 28 5	27 54 4	28 20 0	28 45 1	29 9 8	29 34 1	29 57 8	30 21 1										
55	27 40 5	28 8 5	28 36 1	29 3 3	29 30 1	29 56 5	30 22 4	30 47 9	31 12 8	31 37 3										
56	28 49 5	29 18 9	29 47 9	30 16 5	30 44 7	31 12 4	31 39 7	32 6 5	32 32 8	32 58 5										
57	30 3 1	30 34 0	31 4 5	31 34 6	32 4 3	32 33 5	33 2 2	33 30 5	33 58 3	34 25 5										
58	31 21 7	31 54 3	32 26 4	32 58 2	33 29 5	34 0 4	34 30 8	35 0 7	35 30 1	35 58 9										
59	32 46 1	33 20 5	33 54 5	34 28 1	35 1 2	35 33 9	36 6 2	36 37 9	37 9 1	37 39 7										
60	34 17 0	34 53 4	35 29 5	36 5 1	36 40 3	37 15 1	37 49 4	38 23 2	38 56 4	39 29 1										
61	35 55 3	36 34 1	37 12 5	37 50 5	38 28 0	39 5 1	39 41 8	40 17 9	40 53 5	41 28 6										
62	37 42 4	38 23 8	39 4 8	39 45 5	40 25 7	41 5 6	41 44 9	42 23 8	43 2 2	43 40 0										
63	39 39 7	40 24 1	41 8 2	41 52 0	42 35 4	43 18 4	44 1 0	44 43 1	45 24 7	46 5 9										
64	41 49 1	42 37 1	43 24 8	44 12 2	44 59 4	45 46 2	46 32 7	47 18 7	48 4 4	48 49 6										
65	44 13 2	45 5 4	45 57 5	46 49 4	47 41 1	48 32 6	49 23 9	50 14 9	51 5 7	51 56 0										
66	46 55 3	47 52 8	48 50 3	49 47 9	50 45 4	51 43 0	52 40 5	53 38 0	54 35 4	55 32 7										
66° 33'	48 33 9	49 34 9	50 36 0	51 37 3	52 38 8	53 40 5	54 42 4	55 44 4	56 46 6	57 49 0										

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd.)

Lat	61, 113	62, 118	63 117	64, 116	65 115	66 114	67, 113	68 112	69 111	70 110										
	241	299	242	298	243	297	244	296	245	295	246	294	247	293	248	292	249	291	250	290
0°	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0	0° 0 0
1	22 3	22 5	22 8	23 0	23 2	23 4	23 6	23 8	24 0	24 2	24 4	24 6	24 8	25 0	25 2	25 4	25 6	25 8	26 0	26 2
2	44 6	45 1	45 5	46 0	46 4	46 8	47 3	47 7	48 0	48 4	48 8	49 3	49 7	50 0	50 4	50 8	51 2	51 6	52 0	52 4
3	1 6 9	1 7 6	1 8 3	1 9 0	1 9 7	1 10 3	1 10 9	1 11 5	1 12 1	1 12 6	1 13 2	1 13 8	1 14 4	1 15 0	1 15 6	1 16 2	1 16 8	1 17 4	1 18 0	1 18 6
4	29 3	30 2	31 2	32 1	33 0	33 8	34 6	35 4	36 2	36 9	37 7	38 5	39 3	40 1	40 9	41 7	42 5	43 3	44 1	44 9
5	51 7	52 9	54 1	55 2	56 3	57 4	58 4	59 4	60 4	61 3	62 3	63 3	64 3	65 3	66 3	67 3	68 3	69 3	70 3	71 3
6	2 14 2	2 15 6	2 17 1	2 18 4	2 19 8	2 21 0	2 22 3	2 23 5	2 24 8	2 26 0	2 27 3	2 28 6	2 29 9	3 01 1	3 02 4	3 03 7	3 05 0	3 06 3	3 07 6	3 08 9
7	36 8	38 5	40 1	41 7	43 3	44 8	46 2	47 6	49 0	50 3	51 7	53 1	54 5	55 9	57 3	58 7	60 1	61 5	62 9	64 3
8	59 5	3 1 4	3 3 3	3 5 1	3 6 9	3 8 6	3 10 3	3 11 9	3 13 4	3 14 9	3 16 5	3 18 1	3 19 7	3 21 3	3 22 9	3 24 5	3 26 1	3 27 7	3 29 3	3 30 9
9	3 22 3	24 5	26 6	28 7	30 7	32 6	34 5	36 3	38 0	39 7	41 5	43 4	45 2	47 1	48 9	50 8	52 6	54 5	56 3	58 2
10	45 2	47 7	50 0	52 3	54 6	56 7	58 8	60 8	62 8	64 8	66 8	68 8	70 8	72 8	74 8	76 8	78 8	80 8	82 8	84 8
11	4 8 3	4 11 0	4 13 6	4 16 2	4 18 6	4 21 0	4 23 3	4 25 5	4 27 7	4 29 9	5 02 1	5 04 4	5 06 7	5 09 0	5 11 3	5 13 6	5 15 9	5 18 2	5 20 5	5 22 8
12	31 6	34 5	37 4	40 2	42 9	45 5	48 0	50 4	52 8	55 0	57 3	59 7	62 0	64 3	66 7	69 0	71 3	73 7	76 0	78 3
13	55 0	58 2	61 4	64 4	67 3	70 1	72 9	75 5	78 0	80 5	83 0	85 4	87 9	90 3	92 8	95 2	97 7	100 0	102 5	104 9
14	5 18 7	5 22 1	5 25 5	5 28 8	5 32 0	5 35 0	5 38 0	5 40 8	5 43 6	5 46 2	5 49 0	5 51 8	5 54 6	5 57 4	6 00 2	6 03 0	6 05 8	6 08 6	6 11 4	6 14 2
15	42 6	46 3	49 9	53 4	56 8	60 1	63 3	66 4	69 3	72 1	75 0	77 9	80 8	83 7	86 6	89 5	92 4	95 3	98 2	101 1
16	6 6 7	6 10 7	6 14 6	6 18 3	6 22 0	6 25 5	6 28 9	6 32 2	6 35 3	6 38 4	6 41 5	6 44 6	6 47 7	6 50 8	6 53 9	6 57 0	7 00 1	7 03 2	7 06 3	7 09 4
17	31 1	35 3	39 5	43 5	47 4	51 1	54 8	58 3	61 7	65 0	68 3	71 7	75 0	78 3	81 7	85 0	88 3	91 7	95 0	98 3
18	55 7	7 0 3	7 4 7	7 8 9	7 13 1	7 17 1	7 20 9	7 24 7	7 28 2	7 31 7	7 35 1	7 38 5	7 41 9	7 45 3	7 48 7	7 52 1	7 55 5	7 58 9	8 02 3	8 05 7
19	7 20 7	25 5	30 2	34 7	39 1	43 3	47 4	51 4	55 2	58 8	62 5	66 2	70 0	73 7	77 4	81 1	84 8	88 5	92 2	95 9
20	46 0	51 1	56 0	60 8	65 5	70 1	74 8	79 5	84 2	88 9	93 6	98 3	103 0	107 7	112 4	117 1	121 8	126 5	131 2	135 9
21	8 11 6	8 17 0	8 22 2	8 27 3	8 32 2	8 36 9	8 41 5	8 45 9	8 50 2	8 54 6	8 59 0	9 03 4	9 07 8	9 12 2	9 16 6	9 21 0	9 25 4	9 29 8	9 34 2	9 38 6
22	37 6	43 3	48 8	54 1	59 3	64 3	69 1	73 8	78 5	83 2	87 9	92 6	97 3	102 0	106 7	111 4	116 1	120 8	125 5	130 2
23	9 4 0	9 10 0	9 15 8	9 21 4	9 26 8	9 32 1	9 37 2	9 42 1	9 47 0	9 51 9	9 56 8	10 01 7	10 06 6	10 11 5	10 16 4	10 21 3	10 26 2	10 31 1	10 36 0	10 40 9
24	30 9	37 1	43 2	49 1	54 8	60 4	65 7	71 0	76 3	81 6	86 9	92 2	97 5	102 8	107 1	112 4	117 7	123 0	128 3	133 6
25	58 2	10 4 7	10 11 1	10 17 3	10 23 3	10 29 1	10 34 7	10 40 1	10 45 3	10 50 5	10 55 8	11 01 1	11 06 4	11 11 7	11 17 0	11 22 3	11 27 6	11 32 9	11 38 2	11 43 5
26	10 26 0	32 8	39 5	46 0	52 3	58 3	64 2	70 0	75 7	81 5	87 3	93 1	98 9	104 7	110 5	116 3	122 1	127 9	133 7	139 5
27	54 3	11 1 5	11 8 4	11 15 2	11 21 8	11 28 1	11 34 3	11 40 2	11 46 1	11 52 0	11 57 9	12 03 8	12 09 7	12 15 6	12 21 5	12 27 4	12 33 3	12 39 2	12 45 1	12 51 0
28	11 23 1	30 6	37 9	45 0	51 9	58 5	65 0	71 5	78 0	84 5	91 0	97 5	104 0	110 5	117 0	123 5	130 0	136 5	143 0	149 5
29	52 6	12 0 4	12 8 0	12 15 5	12 22 6	12 29 6	12 36 3	12 42 7	12 49 1	12 55 5	13 01 9	13 08 3	13 14 7	13 21 1	13 27 5	13 33 9	13 40 3	13 46 7	13 53 1	13 59 5
30	12 22 6	30 8	38 8	46 5	54 0	61 3	68 3	75 0	81 5	88 0	94 5	101 0	107 5	114 0	120 5	127 0	133 5	140 0	146 5	153 0
31	53 4	13 1 9	13 10 2	13 18 3	13 26 1	13 33 7	13 41 0	13 48 0	13 54 7	14 01 4	14 08 1	14 14 8	14 21 5	14 28 2	14 34 9	14 41 6	14 48 3	14 55 0	15 01 7	15 08 4
32	13 24 9	33 8	42 4	50 8	59 0	66 8	74 4	81 8	89 1	96 3	103 5	110 7	117 9	125 1	132 3	139 5	146 7	153 9	160 1	167 3
33	57 1	14 6 4	14 15 4	14 24 4	14 32 6	14 40 8	14 48 8	14 56 8	15 04 8	15 12 8	15 20 8	15 28 8	15 36 8	15 44 8	15 52 8	16 00 8	16 08 8	16 16 8	16 24 8	16 32 8

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	61, 113	62, 118	63, 117	64, 116	65, 115	66, 114	67, 113	68, 112	69, 111	70, 110
	241, 299	212, 298	243, 297	244, 296	245, 295	246, 294	247, 293	248, 292	249, 291	250, 290
34	14° 30' 2	14° 39' 8	14° 49' 2	14° 58' 3	15° 7' 1	15° 15' 7	15° 23' 9	15° 31' 9	15° 39' 5	15° 46' 9
35	15 4 1	15 14 1	15 23 9	15 33 4	42 6	51 5	16 0 1	16 8 3	16 16 2	16 23 9
36	38 9	49 4	59 6	16 9 5	16 19 0	16 28 3	37 2	45 8	54 1	17 2 1
37	16 14 8	16 25 7	16 36 2	46 5	56 5	17 6 1	17 15 4	17 24 4	17 33 0	41 3
38	51 7	17 3 0	17 14 0	17 24 7	17 35 1	45 1	54 8	18 4 1	18 13 1	18 21 7
39	17 29 8	41 6	53 0	18 4 1	18 14 9	18 25 3	18 35 4	45 1	54 5	19 3 4
40	18 9 1	18 21 3	18 33 2	44 8	56 0	19 6 9	19 17 3	19 27 5	19 37 2	46 5
41	49 7	19 2 4	19 14 8	19 26 9	19 38 5	49 8	20 0 7	20 11 2	20 21 4	20 31 1
42	19 31 8	45 0	57 9	20 10 4	20 22 6	20 34 3	45 7	56 6	21 7 1	21 17 2
43	20 15 3	20 29 1	20 42 5	55 6	21 8 2	21 20 4	21 32 3	21 43 6	54 6	22 5 1
44	21 0 6	21 14 9	21 28 9	21 42 5	55 6	22 8 3	22 20 7	22 32 5	22 43 9	54 9
45	47 6	22 2 6	22 17 1	22 31 2	22 44 9	58 2	23 11 0	23 23 4	23 35 3	23 46 7
46	22 36 6	52 2	23 7 3	23 22 0	23 36 3	23 50 1	24 3 5	24 16 4	24 28 8	24 40 7
47	23 27 7	23 43 9	59 7	24 15 0	24 29 9	24 44 3	58 3	25 11 7	25 24 7	25 37 1
48	24 21 1	24 38 0	24 54 5	25 10 5	25 26 0	25 41 1	25 55 6	26 9 7	26 23 2	26 36 2
49	25 17 0	25 34 6	25 51 8	26 8 5	26 24 8	26 40 5	26 55 7	27 10 4	27 24 5	27 38 1
50	26 15 7	26 34 1	26 52 0	27 9 5	27 26 5	27 42 9	27 58 8	28 14 2	28 28 9	28 43 2
51	27 17 3	27 36 6	27 55 4	28 13 7	28 31 4	28 48 6	29 5 3	29 21 4	29 36 8	29 51 7
52	28 22 3	28 42 5	29 2 2	29 21 4	29 39 9	29 58 0	30 15 4	30 32 3	30 48 5	31 4 2
53	29 31 0	29 52 2	30 12 8	30 32 9	30 52 5	31 11 4	31 29 7	31 47 4	32 4 5	32 20 9
54	30 43 9	31 6 1	31 27 8	31 48 9	32 9 4	32 29 3	32 48 6	33 7 2	33 25 2	33 42 5
55	32 1 2	32 24 6	32 47 4	33 9 7	33 31 3	33 52 3	34 12 6	34 32 3	34 51 2	35 9 5
56	33 23 8	33 48 4	34 12 5	34 36 0	34 58 8	35 21 0	35 42 5	36 3 3	36 23 3	36 42 6
57	34 52 1	35 18 2	35 43 7	36 8 5	36 32 7	36 56 2	37 19 0	37 41 0	38 2 3	38 22 8
58	36 27 1	36 54 8	37 21 8	37 48 2	38 13 8	38 38 8	39 3 1	39 26 6	39 49 2	40 11 1
59	38 9 8	38 39 2	39 8 0	39 36 1	40 3 5	40 30 1	40 56 0	41 21 1	41 45 4	42 8 8
60	40 1 2	40 32 7	41 3 5	41 33 6	42 2 9	42 31 6	42 59 4	43 26 4	43 52 5	44 17 8
61	42 3 0	42 36 8	43 10 0	43 42 4	44 14 1	44 45 0	45 15 1	45 44 4	46 12 7	46 40 1
62	44 17 2	44 53 8	45 29 7	46 5 0	46 39 4	47 13 1	47 45 9	48 17 9	48 48 9	49 18 9
63	46 46 4	47 26 4	48 5 7	48 44 3	49 22 2	49 59 2	50 35 5	51 10 8	51 45 2	52 18 6
64	49 34 3	50 18 4	51 1 9	51 44 8	52 27 1	53 8 5	53 49 2	54 28 9	55 7 8	55 45 6
65	52 46 0	53 35 6	54 24 7	55 13 3	56 1 4	56 48 8	57 35 5	58 21 4	59 6 5	59 50 7
66	56 30 0	57 27 1	58 24 0	59 20 7	60 17 2	61 13 4	62 9 3	63 4 8	63 59 8	64 54 3
66-33	58 51 5	59 54 3	60 57 1	62 0 2	63 3 4	64 6 7	65 10 2	66 13 9	67 17 7	68 21 6

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Lat	71, 109	72 108	73 107	74 106	75 105	76 104	77 103	78 102	79 101	80 100
	251 289	252 288	253 287	254 286	255 285	256 284	257 283	258 282	259 281	260 280
0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
1	24 4	24 5	24 7	24 8	25 0	25 1	25 2	25 4	25 5	25 6
2	48 8	49 1	49 4	49 7	50 0	50 3	50 5	50 7	50 9	51 1
3	1 13 2	1 13 7	1 14 1	1 14 6	1 15 0	1 15 4	1 15 8	1 16 1	1 16 5	1 16 8
4	37 6	38 3	38 5	39 5	40 1	40 6	41 1	41 6	42 0	42 4
5	2 2 2	2 3 0	2 3 8	2 4 6	2 5 3	2 5 9	2 6 5	2 7 1	2 7 7	2 8 1
6	26 8	27 8	28 7	29 6	30 5	31 3	32 0	32 7	33 4	34 0
7	51 5	52 7	53 8	54 8	55 8	56 8	57 6	58 5	59 2	59 9
8	3 16 3	3 17 7	3 18 9	3 20 1	3 21 3	3 22 4	3 23 4	3 24 3	3 25 1	3 25 9
9	41 3	42 8	44 2	45 6	46 9	48 1	49 2	50 3	51 2	52 1
10	4 6 4	4 8 1	4 9 7	4 11 2	4 12 6	4 14 0	4 15 2	4 16 4	4 17 5	4 18 5
11	31 7	33 5	35 3	37 0	38 5	40 0	41 4	42 7	43 9	45 0
12	57 1	59 2	5 1 1	5 2 9	5 4 7	5 6 3	5 7 8	5 9 2	5 10 5	5 11 7
13	5 22 8	5 25 0	27 1	29 1	31 0	32 7	34 4	35 9	37 3	38 6
14	48 7	51 1	53 4	55 5	57 5	59 4	6 1 2	6 2 9	6 4 4	6 5 8
15	6 14 8	6 17 4	6 19 8	6 22 2	6 24 3	6 26 4	28 3	30 1	31 7	33 2
16	41 2	44 0	46 6	49 1	51 4	53 7	55 7	57 6	59 4	7 1 0
17	7 7 9	7 10 9	7 13 7	7 16 3	7 18 8	7 21 2	7 23 4	7 25 4	7 27 3	29 0
18	35 0	38 1	41 1	43 9	46 5	49 0	51 3	53 5	55 5	57 3
19	8 2 3	8 5 6	8 8 8	8 11 8	8 14 6	8 17 2	8 19 7	8 22 0	8 24 1	8 26 1
20	30 0	33 5	36 9	40 0	43 0	45 8	48 4	50 9	53 1	55 2
21	58 1	9 1 8	9 5 3	9 8 7	9 11 8	9 14 8	9 17 6	9 20 1	9 22 5	9 24 7
22	9 26 6	30 5	34 3	37 8	41 1	44 2	47 1	49 8	52 3	54 6
23	55 6	59 7	10 3 6	10 7 3	10 10 8	10 14 1	10 17 2	10 20 0	10 22 6	10 25 0
24	10 25 0	10 29 3	33 5	37 3	41 0	44 5	47 7	50 7	53 4	56 0
25	55 0	59 5	11 3 8	11 7 9	11 11 7	11 15 4	11 18 7	11 21 9	11 24 8	11 27 4
26	11 25 5	11 30 2	34 7	39 0	43 0	46 8	50 4	53 7	56 7	59 5
27	56 5	12 1 5	12 6 6	12 10 7	12 14 9	12 18 9	12 22 6	12 26 0	12 29 2	1 32 1
28	12 28 2	33 4	38 4	43 0	47 5	51 6	55 5	59 1	13 2 4	13 5 5
29	13 0 6	13 6 0	15 11 2	13 16 0	13 20 7	13 25 0	13 29 0	13 32 8	36 3	39 5
30	33 6	39 3	44 7	49 8	54 6	59 1	14 3 4	14 7 3	14 10 9	14 14 2
31	14 7 4	14 13 3	14 19 0	14 24 3	14 29 3	14 34 0	38 4	42 5	46 3	49 8
32	42 0	48 2	54 1	59 6	15 4 9	15 9 8	15 14 4	15 18 7	15 22 6	15 26 2
33	15 17 5	15 23 9	15 30 0	15 35 8	41 3	46 4	51 2	55 7	59 8	16 3 6

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd)

Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd.)

Lat	81, 22	82, 23	83, 24	84, 25	85, 26	86, 27	87, 28	88, 29	89, 30	90, 31	91, 32	92, 33	93, 34	94, 35	95, 36	96, 37	97, 38	98, 39	99, 40	100, 41	101, 42	102, 43	103, 44	104, 45	105, 46	106, 47	107, 48	108, 49	109, 50	110, 51	111, 52	112, 53	113, 54	114, 55	115, 56	116, 57	117, 58	118, 59	119, 60	120, 61	121, 62	122, 63	123, 64	124, 65	125, 66	126, 67	127, 68	128, 69	129, 70	130, 71	131, 72	132, 73	133, 74	134, 75	135, 76	136, 77	137, 78	138, 79	139, 80	140, 81	141, 82	142, 83	143, 84	144, 85	145, 86	146, 87	147, 88	148, 89	149, 90	150, 91	151, 92	152, 93	153, 94	154, 95	155, 96	156, 97	157, 98	158, 99	159, 100	160, 101	161, 102	162, 103	163, 104	164, 105	165, 106	166, 107	167, 108	168, 109	169, 110	170, 111	171, 112	172, 113	173, 114	174, 115	175, 116	176, 117	177, 118	178, 119	179, 120	180, 121	181, 122	182, 123	183, 124	184, 125	185, 126	186, 127	187, 128	188, 129	189, 130	190, 131	191, 132	192, 133	193, 134	194, 135	195, 136	196, 137	197, 138	198, 139	199, 140	200, 141	201, 142	202, 143	203, 144	204, 145	205, 146	206, 147	207, 148	208, 149	209, 150	210, 151	211, 152	212, 153	213, 154	214, 155	215, 156	216, 157	217, 158	218, 159	219, 160	220, 161	221, 162	222, 163	223, 164	224, 165	225, 166	226, 167	227, 168	228, 169	229, 170	230, 171	231, 172	232, 173	233, 174	234, 175	235, 176	236, 177	237, 178	238, 179	239, 180	240, 181	241, 182	242, 183	243, 184	244, 185	245, 186	246, 187	247, 188	248, 189	249, 190	250, 191	251, 192	252, 193	253, 194	254, 195	255, 196	256, 197	257, 198	258, 199	259, 200	260, 201	261, 202	262, 203	263, 204	264, 205	265, 206	266, 207	267, 208	268, 209	269, 210	270, 211	271, 212	272, 213	273, 214	274, 215	275, 216	276, 217	277, 218	278, 219	279, 220	280, 221	281, 222	282, 223	283, 224	284, 225	285, 226	286, 227	287, 228	288, 229	289, 230	290, 231	291, 232	292, 233	293, 234	294, 235	295, 236	296, 237	297, 238	298, 239	299, 240	300, 241	301, 242	302, 243	303, 244	304, 245	305, 246	306, 247	307, 248	308, 249	309, 250	310, 251	311, 252	312, 253	313, 254	314, 255	315, 256	316, 257	317, 258	318, 259	319, 260	320, 261	321, 262	322, 263	323, 264	324, 265	325, 266	326, 267	327, 268	328, 269	329, 270	330, 271	331, 272	332, 273	333, 274	334, 275	335, 276	336, 277	337, 278	338, 279	339, 280	340, 281	341, 282	342, 283	343, 284	344, 285	345, 286	346, 287	347, 288	348, 289	349, 290	350, 291	351, 292	352, 293	353, 294	354, 295	355, 296	356, 297	357, 298	358, 299	359, 300	360, 301	361, 302	362, 303	363, 304	364, 305	365, 306	366, 307	367, 308	368, 309	369, 310	370, 311	371, 312	372, 313	373, 314	374, 315	375, 316	376, 317	377, 318	378, 319	379, 320	380, 321	381, 322	382, 323	383, 324	384, 325	385, 326	386, 327	387, 328	388, 329	389, 330	390, 331	391, 332	392, 333	393, 334	394, 335	395, 336	396, 337	397, 338	398, 339	399, 340	400, 341	401, 342	402, 343	403, 344	404, 345	405, 346	406, 347	407, 348	408, 349	409, 350	410, 351	411, 352	412, 353	413, 354	414, 355	415, 356	416, 357	417, 358	418, 359	419, 360	420, 361	421, 362	422, 363	423, 364	424, 365	425, 366	426, 367	427, 368	428, 369	429, 370	430, 371	431, 372	432, 373	433, 374	434, 375	435, 376	436, 377	437, 378	438, 379	439, 380	440, 381	441, 382	442, 383	443, 384	444, 385	445, 386	446, 387	447, 388	448, 389	449, 390	450, 391	451, 392	452, 393	453, 394	454, 395	455, 396	456, 397	457, 398	458, 399	459, 400	460, 401	461, 402	462, 403	463, 404	464, 405	465, 406	466, 407	467, 408	468, 409	469, 410	470, 411	471, 412	472, 413	473, 414	474, 415	475, 416	476, 417	477, 418	478, 419	479, 420	480, 421	481, 422	482, 423	483, 424	484, 425	485, 426	486, 427	487, 428	488, 429	489, 430	490, 431	491, 432	492, 433	493, 434	494, 435	495, 436	496, 437	497, 438	498, 439	499, 440	500, 441	501, 442	502, 443	503, 444	504, 445	505, 446	506, 447	507, 448	508, 449	509, 450	510, 451	511, 452	512, 453	513, 454	514, 455	515, 456	516, 457	517, 458	518, 459	519, 460	520, 461	521, 462	522, 463	523, 464	524, 465	525, 466	526, 467	527, 468	528, 469	529, 470	530, 471	531, 472	532, 473	533, 474	534, 475	535, 476	536, 477	537, 478	538, 479	539, 480	540, 481	541, 482	542, 483	543, 484	544, 485	545, 486	546, 487	547, 488	548, 489	549, 490	550, 491	551, 492	552, 493	553, 494	554, 495	555, 496	556, 497	557, 498	558, 499	559, 500	560, 501	561, 502	562, 503	563, 504	564, 505	565, 506	566, 507	567, 508	568, 509	569, 510	570, 511	571, 512	572, 513	573, 514	574, 515	575, 516	576, 517	577, 518	578, 519	579, 520	580, 521	581, 522	582, 523	583, 524	584, 525	585, 526	586, 527	587, 528	588, 529	589, 530	590, 531	591, 532	592, 533	593, 534	594, 535	595, 536	596, 537	597, 538	598, 539	599, 540	600, 541	601, 542	602, 543	603, 544	604, 545	605, 546	606, 547	607, 548	608, 549	609, 550	610, 551	611, 552	612, 553	613, 554	614, 555	615, 556	616, 557	617, 558	618, 559	619, 560	620, 561	621, 562	622, 563	623, 564	624, 565	625, 566	626, 567	627, 568	628, 569	629, 570	630, 571	631, 572	632, 573	633, 574	634, 575	635, 576	636, 577	637, 578	638, 579	639, 580	640, 581	641, 582	642, 583	643, 584	644, 585	645, 586	646, 587	647, 588	648, 589	649, 590	650, 591	651, 592	652, 593	653, 594	654, 595	655, 596	656, 597	657, 598	658, 599	659, 600	660, 601	661, 602	662, 603	663, 604	664, 605	665, 606	666, 607	667, 608	668, 609	669, 610	670, 611	671, 612	672, 613	673, 614	674, 615	675, 616	676, 617	677, 618	678, 619	679, 620	680, 621	681, 622	682, 623	683, 624	684, 625	685, 626	686, 627	687, 628	688, 629	689, 630	690, 631	691, 632	692, 633	693, 634	694, 635	695, 636	696, 637	697, 638	698, 639	699, 640	700, 641	701, 642	702, 643	703, 644	704, 645	705, 646	706, 647	707, 648	708, 649	709, 650	710, 651	711, 652	712, 653	713, 654	714, 655	715, 656	716, 657	717, 658	718, 659	719, 660	720, 661	721, 662	722, 663	723, 664	724, 665	725, 666	726, 667	727, 668	728, 669	729, 670	730, 671	731, 672	732, 673	733, 674	734, 675	735, 676	736, 677	737, 678	738, 679	739, 680	740, 681	741, 682	742, 683	743, 684	744, 685	745, 686	746, 687	747, 688	748, 689	749, 690	750, 691	751, 692	752, 693	753, 694	754, 695	755, 696	756, 697	757, 698	758, 699	759, 700	760, 701	761, 702	762, 703	763, 704	764, 705	765, 706	766, 707	767, 708	768, 709	769, 710	770, 711	771, 712	772, 713	773, 714	774, 715	775, 716	776, 717	777, 718	778, 719	779, 720	780, 721	781, 722	782, 723	783, 724	784, 725	785, 726	786, 727	787, 728	788, 729	789, 730	790, 731	791, 732	792, 733	793, 734	794, 735	795, 736	796, 737	797, 738	798, 739	799, 740	800, 741	801, 742	802, 743	803, 744	804, 745	805, 746	806, 747	807, 748	808, 749	809, 750	810, 751	811, 752	812, 753	813, 754	814, 755	815, 756	816, 757	817, 758	818, 759	819, 760	820, 761	821, 762	822, 763	823, 764	824, 765	825, 766	826, 767	827, 768	828, 769	829, 770	830, 771	831, 772	832, 773	833, 774	834, 775	835, 776	836, 777	837, 778	838, 779	839, 780	840, 781	841, 782	842, 783	843, 784	844, 785	845, 786	846, 787	847, 788	848, 789	849, 790	850, 791	851, 792	852, 793	853, 794	854, 795	855, 796	856, 797	857, 798	858, 799	859, 800	860, 801	861, 802	862, 803	863, 804	864, 805	865, 806	866, 807	867, 808	868, 809	869, 810	870, 811	871, 812	872, 813	873, 814	874, 815	875, 816	876, 817	877, 818	878, 819	879, 820	880, 821	881, 822	882, 823	883, 824	884, 825	885, 826	886, 827	887, 828	888, 829	889, 830	890, 831	891, 832	892, 833	893, 834	894, 835	895, 836	896, 837	897, 838	898, 839	899, 840	900, 841	901, 842	902, 843	903, 844	904, 845	905, 846	906, 847	907, 848	908, 849	909, 850	910, 851	911, 852	912, 853	913, 854	914, 855	915, 856	916, 857	917, 858	918, 859	919, 860	920, 861	921, 862	922, 863	923, 864	924, 865	925, 866	926, 867	927, 868	928, 869	929, 870	930, 871	931, 872	932, 873	933, 874	934, 875	935, 876	936, 877	937, 878	938, 879	939, 880	940, 881	941, 882	942, 883	943, 884	944, 885	945, 886	946, 887	947, 888	948, 889	949, 890	950, 891	951, 892	952, 893	953, 894	954, 895	955, 896	956, 897	957, 898	958, 899	959, 900	960, 901	961, 902	962, 903	963, 904	964, 905	965, 906	966, 907	967, 908	968, 909	969, 910	970, 911	971, 912	972, 913	973, 914	974, 915	975, 916	976, 917	977, 918	978, 919	979, 920	980, 921	981, 922	982, 923	983, 924	984, 925	985, 926	986, 927	987, 928	988, 929	989, 930	990, 931	991, 932	992, 933	993, 934	994, 935	995, 936	996, 937	997, 938	998, 939	999, 940	1000, 941	1001, 942	1002, 943	1003, 944	1004, 945	1005, 946	1006, 947	1007, 948	1008, 949	1009, 950	1010, 951	1011, 952	1012, 953	1013, 954	1014, 955	1015, 956	1016, 957	1017, 958	1018, 959	1019, 960	1020, 961	1021, 962	1022, 963	1023, 964	1024, 965	1025, 966	1026, 967	1027, 968	1028, 969	1029, 970	1030, 971	1031, 972	1032, 973	1033, 974	1034, 975	1035, 976	1036, 977	1037
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Table III—Ascensional Difference of every Ecliptic Degree at every Degree of Terrestrial Latitude—(Contd.)

Lat	81, 94	82, 98	83, 97	84, 96	85, 95	86, 94	87, 93	88, 92	89, 91	90
	261 279	262 278	263 277	264 276	265 275	266 274	267 273	268 272	269 271	270
34°	16° 45 4	16° 48 6	16° 51 5	16° 53 9	16° 56 0	16° 57 7	16° 59 1	17° 0 0	17° 0 6	17° 0 8
35	17 25 0	17 28 3	17 31 2	17 33 0	17 36 0	17 37 7	17 36 1	40 1	40 7	40 9
36	18 5 6	18 9 1	18 12 1	18 14 8	18 17 1	18 18 9	18 20 4	18 21 4	18 22 0	18 22 2
37	47 4	51 0	54 2	57 0	59 4	19 1 3	19 2 8	19 3 9	19 4 5	19 4 7
38	19 30 6	19 34 3	19 37 7	19 40 6	19 43 0	45 0	46 6	47 7	48 4	48 6
39	20 15 1	20 19 0	20 22 5	20 25 5	20 28 1	20 30 1	20 31 8	20 32 9	20 33 6	20 33
40	21 1 1	21 5 2	21 8 8	21 12 0	21 14 6	21 16 8	21 18 5	21 19 7	21 20 4	21 20 7
41	48 8	53 0	56 8	60 1	62 8	65 1	67 9	69 1	71 8	72 9 2
42	22 38 2	22 42 6	22 46 5	49 9	52 8	55 2	57 0	58 4	59 1	59 4
43	23 29 5	23 34 1	23 38 2	23 41 7	23 44 7	23 47 2	23 49 1	23 50 5	23 51 3	23 51 6
44	24 22 5	24 27 6	24 31 9	24 35 6	24 38 7	24 41 3	24 43 3	24 44 7	24 45 6	24 45 9
45	25 18 4	25 23 4	25 27 8	25 31 7	25 35 0	25 37 7	25 39 7	25 41 2	25 42 1	25 42 4
46	26 16 3	26 21 6	26 26 2	26 30 3	26 33 7	26 36 5	26 38 7	26 40 2	26 41 2	26 41 5
47	27 17 0	27 22 5	27 27 3	27 31 5	27 35 1	27 38 0	27 40 3	27 42 0	27 42 9	27 43 3
48	28 20 5	28 26 3	28 31 3	28 35 7	28 39 5	28 42 5	28 44 9	28 46 6	28 47 7	28 48 0
49	29 27 2	29 33 3	29 38 6	29 43 2	29 47 1	29 50 3	29 52 8	29 54 6	29 55 7	29 56 0
50	30 37 5	30 43 8	30 49 4	30 54 2	30 58 3	31 1 7	31 4 3	31 6 2	31 7 3	31 7 7
51	31 51 7	31 58 3	32 4 1	32 9 2	32 13 5	32 17 0	32 19 8	32 21 8	32 23 0	32 23 4
52	33 10 2	33 17 1	33 23 3	33 28 6	33 33 1	33 36 9	33 39 7	33 41 8	33 43 1	33 43 5
53	34 33 5	34 40 8	34 47 3	34 53 0	34 57 7	35 1 7	35 4 7	35 6 9	35 8 2	35 8 7
54	36 2 3	36 10 1	36 16 9	36 22 9	36 28 0	36 32 1	36 35 3	36 37 6	36 39 0	36 39 5
55	37 37 4	37 45 6	37 52 8	37 59 2	38 4 5	38 8 9	38 12 3	38 14 8	38 16 3	38 16 8
56	39 19 5	39 28 2	39 36 0	39 42 7	39 48 4	39 53 1	39 56 7	39 59 3	40 0 9	40 1 4
57	41 9 8	41 19 1	41 27 4	41 34 6	41 40 7	41 45 6	41 49 5	41 52 3	41 54 0	41 54 6
58	43 9 7	43 19 7	43 28 6	43 36 3	43 42 8	43 48 2	43 52 3	43 55 3	43 57 1	43 57 7
59	45 20 9	45 31 7	45 41 3	45 49 6	45 56 7	46 2 5	46 7 0	46 10 2	46 12 2	46 12 8
60	47 43 8	47 57 5	48 7 9	48 17 0	48 24 7	48 31 0	48 35 9	48 39 5	48 41 6	48 42 3
61	50 27 4	50 40 3	50 51 8	51 1 7	51 10 2	51 17 2	51 22 7	51 26 6	51 28 9	51 29 7
62	53 30 4	53 44 8	53 57 6	54 8 8	54 18 3	54 26 1	54 32 2	54 36 6	54 39 2	54 40 1
63	57 1 6	57 18 0	57 32 7	57 45 5	57 56 4	58 5 3	58 12 3	58 17 4	58 20 4	58 21 4
64	61 12 7	61 32 1	61 49 5	62 4 7	62 17 7	62 28 4	62 36 8	62 42 8	62 46 4	62 47 7
65	66 26 7	66 51 2	67 13 3	67 32 8	67 49 5	68 3 3	68 14 2	68 22 0	68 26 7	68 28 3
66	73 45 3	74 22 4	74 56 5	75 27 2	75 54 0	76 16 7	76 34 7	76 47 9	76 55 9	76 58 3
66° 33'	80 12 3	81 17 4	82 22 6	83 27 9	84 33 1	85 38 5	86 43 8	87 49 2	88 54 6	90 0 0



Table IV—The Apparent Time of Sunrise, when latitude and declination are of different names, or the Apparent Time of Sunset, when latitude and declination are of the same name.

Lat.	Declinations													
	0	1	2	3	4	5	6	7	8	9	10	11	12	
	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	H.M.S	
0°	6 0 06	0 06	0 06	0 06	0 06	0 06	0 06	0 06	0 06	0 06	0 06	0 06	0 06	
1	6 0 06	0 46	0 86	0 136	0 176	0 216	0 256	0 296	0 346	0 386	0 426	0 476	0 51	
2	6 0 06	0 86	0 176	0 256	0 346	0 426	0 506	0 596	1 76	1 166	1 256	1 336	1 42	
3	6 0 06	0 136	0 256	0 386	0 506	1 36	1 166	1 286	1 416	1 546	2 76	2 206	2 33	
4	6 0 06	0 176	0 346	0 506	1 76	1 246	1 416	1 586	2 156	2 326	2 506	3 76	3 24	
5	6 0 06	0 216	0 426	1 36	1 246	1 456	2 66	2 286	2 496	3 106	3 326	3 546	4 16	
6	6 0 06	0 256	0 506	1 166	1 416	2 66	2 326	2 576	3 236	3 496	4 156	4 416	5 7	
7	6 0 06	0 296	0 596	1 246	1 586	2 286	2 576	3 276	3 576	4 276	4 586	5 286	5 59	
8	6 0 06	0 346	1 76	1 416	2 156	2 496	3 236	3 576	4 326	5 66	5 416	6 166	6 51	
9	6 0 06	0 386	1 166	1 546	2 326	3 116	3 496	4 276	5 66	5 456	6 246	7 36	7 43	
10	6 0 06	0 426	1 256	2 76	2 506	3 326	4 156	4 586	5 416	6 246	7 86	7 516	8 36	
11	6 0 06	0 476	1 386	2 206	3 76	3 546	4 416	5 286	6 166	7 36	7 516	8 406	9 23	
12	6 0 06	0 516	1 126	2 336	3 246	4 166	5 76	5 596	6 516	7 436	8 366	9 286	10 21	
13	6 0 06	0 556	1 516	2 466	3 426	4 386	5 346	6 306	7 266	8 236	9 206	10 176	11 13	
14	6 0 06	1 06	2 06	3 06	4 06	5 06	6 06	7 16	8 26	9 36	10 56	11 76	12 9	
15	6 0 06	1 46	2 96	3 136	4 186	5 226	6 276	7 326	8 386	9 446	10 506	11 576	13 4	
16	6 0 06	1 96	2 186	3 276	4 366	5 456	6 546	8 46	9 146	10 256	11 366	12 476	13 59	
17	6 0 06	1 136	2 276	3 406	4 546	6 86	7 226	8 366	9 516	11 66	12 226	13 336	14 54	
18	6 0 06	1 186	2 366	3 546	5 126	6 316	7 506	9 96	10 286	11 486	13 86	14 256	15 50	
19	6 0 06	1 236	2 456	4 86	5 316	6 546	8 186	9 426	11 66	12 306	13 556	15 216	16 47	
20	6 0 06	1 276	2 556	4 226	5 503	7 186	8 466	10 156	11 446	13 136	14 436	16 146	17 45	
21	6 0 06	1 326	3 46	4 376	6 96	7 426	9 156	10 486	12 226	13 576	15 316	17 76	18 43	
22	6 0 06	1 376	3 146	4 516	6 296	8 66	9 446	11 226	13 16	14 406	16 206	18 10	19 42	
23	6 0 06	1 426	3 246	5 66	6 486	8 316	10 146	11 576	13 416	15 256	17 106	18 546	20 42	
24	6 0 06	1 476	3 346	5 216	7 86	8 566	10 446	12 326	14 216	16 116	18 16	19 526	21 43	
25	6 0 06	1 526	3 446	5 366	7 286	9 216	11 146	13 86	15 26	16 576	18 526	20 486	22 43	
26	6 0 06	1 576	3 546	5 526	7 496	9 476	11 456	13 446	15 436	17 436	19 446	21 466	23 48	
27	6 0 06	2 26	4 56	6 76	8 106	10 136	12 176	14 216	16 266	18 316	20 376	22 446	24 52	
28	6 0 06	2 86	4 156	6 236	8 316	10 406	12 496	14 586	17 96	19 196	21 316	23 446	25 57	
29	6 0 06	2 136	4 266	6 406	8 536	11 76	13 226	15 376	17 526	20 96	22 266	24 446	27 4	
30	6 0 06	2 196	4 376	6 566	9 156	11 356	13 556	16 166	18 376	20 596	23 226	25 466	28 12	
31	6 0 06	2 246	4 496	7 136	9 386	12 36	14 296	16 556	19 236	21 516	24 206	26 506	29 21	
32	6 0 06	2 306	5 06	7 306	10 16	12 326	15 46	17 366	20 96	22 436	25 186	27 546	30 32	
33	6 0 06	2 366	5 126	7 486	10 256	13 26	15 396	18 186	20 576	23 376	26 186	29 06	31 44	

NB—The Apparent Time of Sunset, when latitude and declination are of different names, or the Apparent Time of Sunrise, when latitude and declination are of the same name, is obtained by deducting the tabular figures from 12 hours

## TABLES

Table IV—The Apparent Time of Sunrise, when latitude and declination are of different names, or the Apparent Time of Sunset, when latitude and declination are of the same name—(Contd)

Lat	Declinations											
	13	14	15	16	17	18	19	20	21	22	23	23°27'
0°	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0	H M S 6 0 0
1	6 0 55	6 1 0	6 1 4	6 1 9	6 1 13	6 1 18	6 1 23	6 1 27	6 1 32	6 1 37	6 1 42	6 1 44
2	6 1 51	6 2 0	6 2 9	6 2 18	6 2 27	6 2 36	6 2 45	6 2 55	6 3 4	6 3 14	6 3 24	6 3 28
3	6 2 46	6 3 0	6 3 13	6 3 27	6 3 40	6 3 54	6 4 8	6 4 22	6 4 37	6 4 51	6 5 6	6 5 13
4	6 3 42	6 4 0	6 4 18	6 4 36	6 4 54	6 5 12	6 5 31	6 5 50	6 6 9	6 6 29	6 6 48	6 6 57
5	6 4 38	6 5 0	6 5 22	6 5 45	6 6 8	6 6 31	6 6 54	6 7 18	6 7 42	6 8 6	6 8 31	6 8 42
6	6 5 34	6 6 0	6 6 27	6 6 54	6 7 22	6 7 50	6 8 18	6 8 46	6 9 15	6 9 44	6 10 14	6 10 27
7	6 6 30	6 7 1	6 7 32	6 8 4	6 8 36	6 9 9	6 9 42	10 15	6 10 18	6 11 22	6 11 57	6 12 13
8	6 7 26	6 8 2	6 8 38	6 9 14	6 9 51	6 10 28	6 11 6	6 11 44	6 12 22	6 13 1	6 13 41	6 13 59
9	6 8 23	6 9 3	6 9 44	6 10 25	6 11 6	6 11 48	6 12 30	6 13 13	6 13 57	6 14 41	6 15 25	6 15 45
10°	6 9 20	6 10 5	6 10 50	6 11 36	6 12 22	6 13 8	6 13 55	6 14 43	6 15 31	6 16 20	6 17 10	6 17 33
11	6 10 17	6 11 7	6 11 56	6 12 47	6 13 38	6 14 29	6 15 21	6 16 14	6 17 7	6 18 1	6 18 56	6 19 21
12	6 11 15	6 12 9	6 13 4	6 13 59	6 14 54	6 15 50	6 16 47	6 17 45	6 18 43	6 19 42	6 20 42	6 21 10
13	6 12 13	6 13 12	6 14 11	6 15 11	6 16 11	6 17 12	6 18 14	6 19 17	6 20 20	6 21 25	6 22 30	6 23 0
14	6 13 12	6 14 15	6 15 19	6 16 24	6 17 29	6 18 35	6 19 42	6 20 50	6 21 58	6 23 8	6 24 18	6 24 50
15	6 14 11	6 15 19	6 16 28	6 17 38	6 18 48	6 19 59	6 21 11	6 22 33	6 23 37	6 24 52	6 26 7	6 26 42
16	6 15 11	6 16 24	6 17 38	6 18 52	6 20 7	6 21 23	6 22 40	6 23 58	6 25 17	6 26 58	6 28 23	6 28 35
17	6 16 11	6 17 29	6 18 48	6 20 7	6 21 27	6 22 48	6 24 10	6 25 33	6 26 58	6 28 23	6 29 50	6 30 29
18	6 17 12	6 18 35	6 19 59	6 21 23	6 22 48	6 24 14	6 25 42	6 27 10	6 28 40	6 30 10	6 31 43	6 32 25
19	6 18 14	6 19 42	6 21 11	6 22 40	6 24 10	6 25 42	6 27 14	6 28 48	6 30 23	6 31 59	6 33 37	6 34 22
20	6 19 17	6 20 50	6 22 23	6 23 58	6 25 33	6 27 10	6 28 48	6 30 27	6 32 8	6 33 49	6 35 33	6 36 20
21	6 20 20	6 21 59	6 23 37	6 25 17	6 26 58	6 28 40	6 30 23	6 32 8	6 33 54	6 35 41	6 37 31	6 38 20
22	6 21 25	6 23 8	6 24 52	6 26 37	6 28 23	6 30 10	6 31 59	6 33 49	6 35 41	6 37 35	6 39 30	6 40 22
23	6 22 30	6 24 18	6 26 8	6 27 58	6 29 50	6 31 43	6 33 37	6 35 33	6 37 31	6 39 30	6 41 31	6 42 26
24	6 23 36	6 25 30	6 27 24	6 29 20	6 31 18	6 33 16	6 35 16	6 37 18	6 39 22	6 41 27	6 43 34	6 44 33
25	6 24 43	6 26 42	6 28 43	6 30 44	6 32 47	6 34 52	6 36 57	6 39 5	6 41 15	6 43 26	6 45 40	6 46 41
26	6 25 52	6 27 56	6 30 2	6 32 9	6 34 18	6 36 28	6 38 40	6 40 54	6 43 10	6 45 28	6 47 48	6 48 51
27	6 27 1	6 29 12	6 31 23	6 33 36	6 35 51	6 38 7	6 40 25	6 42 45	6 45 7	6 47 31	6 49 58	6 51 5
28	6 28 12	6 30 28	6 32 46	6 35 5	6 37 25	6 39 48	6 42 12	6 44 38	6 47 6	6 49 37	6 52 11	6 53 20
29	6 29 25	6 31 47	6 34 10	6 36 35	6 39 2	6 41 30	6 44 1	6 46 33	6 49 8	6 51 46	6 54 26	6 55 30
30	6 30 38	6 33 6	6 35 36	6 38 7	6 40 40	6 43 15	6 45 52	6 48 31	6 51 13	6 53 57	6 56 45	6 58 1
31	6 31 54	6 34 28	6 37 4	6 39 41	6 42 21	6 45 2	6 47 46	6 50 32	6 53 20	6 56 12	6 58 6	7 0 26
32	6 33 11	6 35 51	6 38 33	6 41 17	6 44 3	6 46 52	6 49 42	6 52 35	6 55 31	6 58 30	7 1 32	7 2 54
33	6 34 29	6 37 16	6 40 5	6 42 56	6 45 48	6 48 44	6 51 41	6 54 41	6 57 44	7 0 51	7 4 0	7 5 27

NB—The Apparent Time of Sunset, when latitude and declination are of different names, or the Apparent Time of Sunrise, when latitude and declination are of the same name, is obtained by deducting the tabular figures from 12 hours

Table IV—The Apparent Time of Sunrise, when latitude and declination are of different names, or the Apparent Time of Sunset, when latitude and declination are of the same name—(Contd.)

Lat.	Declinations												
	0	1	2	3	4	5	6	7	8	9	10	11	12
34°	H M S	H M S	H M S	H M S	H M S	H M S	H M S	H M S	H M S	H M S	H M S	H M S	H M S
35	6 0 06	2 426	5 246	8 256	11 146	14 36	16 166	19 06	21 456	24 326	27 196	30 86	32
36	6 0 06	2 546	5 496	8 446	11 396	14 356	17 316	20 28	23 276	26 266	29 266	32 276	35
37	6 0 06	3 16	6 26	9 36	12 56	15 76	18 106	21 166	24 166	27 256	30 356	33 416	36
38	6 0 06	3 36	6 46	9 56	12 326	15 416	18 506	22 16	25 136	28 266	31 406	34 566	38
39	6 0 06	3 146	6 296	9 446	12 596	16 156	19 326	22 506	26 86	29 296	32 506	36 146	39
40	6 0 06	3 216	6 436	10 56	13 276	16 506	20 146	23 326	27 66	30 336	34 26	37 336	41
41	6 0 06	3 266	6 576	10 276	13 566	17 276	20 586	24 306	28 46	31 396	35 166	38 556	42
42	6 0 06	3 376	7 126	10 496	14 266	18 46	21 436	25 236	29 56	32 486	36 326	40 196	44
43	6 0 06	3 446	7 286	11 126	14 576	18 436	22 306	26 186	30 76	33 586	37 516	41 466	45
44	6 0 06	3 526	7 446	11 366	15 296	19 236	23 186	27 146	31 126	35 126	39 136	43 176	47
45	6 0 06	4 06	8 06	12 16	16 26	20 56	24 86	28 136	32 196	36 276	40 376	44 506	49
46	6 0 06	4 96	8 176	12 276	16 376	20 486	25 06	29 136	33 286	37 466	42 56	46 276	50
47	6 0 06	4 186	8 356	12 536	17 126	21 326	25 536	30 166	34 406	39 76	43 366	48 86	52
48	6 0 06	4 276	8 536	13 216	17 456	22 186	26 416	31 216	35 556	40 316	45 106	49 526	54
49	6 0 06	4 366	9 136	13 506	18 276	23 66	27 476	32 296	37 136	42 06	46 496	51 416	56
50	6 0 06	4 466	9 326	14 196	19 76	23 566	28 476	33 306	38 346	43 316	48 316	53 556	58
51	6 0 06	4 566	9 536	14 516	19 496	24 496	29 506	34 536	39 526	45 76	50 186	55 337	02
52	6 0 06	5 76	10 156	15 236	20 326	25 436	30 566	36 106	41 276	46 476	52 106	57 377	3
53	6 0 06	5 16	10 376	15 576	21 186	26 406	32 66	37 316	43 06	48 326	54 86	59 437	5
54	6 0 06	5 306	11 16	16 336	22 66	27 406	33 166	38 556	44 376	50 226	56 117	2 47	8
55	6 0 06	5 436	11 266	17 106	22 566	28 436	34 326	40 246	46 196	52 186	58 207	4 257	10
56	6 0 06	5 566	11 526	17 506	23 486	29 476	35 51	41 576	48 66	54 197	0 377	7 07	13
57	6 0 06	6 106	12 206	18 316	24 446	30 586	37 156	43 366	50 06	56 287	3 17	9 407	16
58	6 0 06	6 246	12 496	19 156	25 426	32 126	38 446	45 206	51 595	58 447	5 347	12 307	19
59	6 0 06	6 406	13 206	20 16	26 445	33 296	40 186	47 106	54 67	1 87	8 167	15 307	22
60	6 0 06	6 566	13 526	20 506	27 506	34 526	41 576	49 76	56 217	3 417	11 87	18 427	25
61	6 0 06	7 136	14 276	21 426	28 536	36 196	43 436	51 116	58 457	6 197	14 127	22 77	30
62	6 0 06	7 326	15 46	22 386	30 176	37 536	45 366	53 247	1 187	9 157	17 287	25 467	34
63	6 0 06	7 516	15 436	23 376	31 336	39 336	47 376	55 477	4 37	12 267	20 597	29 427	39
64	6 0 06	8 126	16 256	24 406	32 586	41 206	49 476	58 117	6 597	15 487	24 467	33 577	43
65	6 0 06	8 356	17 116	25 496	34 306	43 156	52 67	1 47	10 107	19 257	28 527	38 337	48
66	6 0 06	8 596	18 06	27 26	36 96	45 206	51 377	4 27	13 367	23 217	33 197	43 337	54
66 33	6 0 06	9 136	18 286	27 456	37 66	46 136	56 77	5 467	15 377	25 407	35 597	46 97	57

N.B.—The Apparent Time of Sunset, when latitude and declination are of different names, or the Apparent time of Sunrise, when latitude and declination are of the same name, is obtained by deducting the tabular figures from 12 hours.

Table IV—The Apparent Time of Sunrise, when latitude and declination are of different names, or the Apparent Time of Sunset, when latitude and declination are of the same name—(Contd)

Lat.	Declinations											
	13	14	15	16	17	18	19	20	21	22	23	23°27'
34	HMS	HMS	HMS	HMS	HMS	HMS	HMS	HMS	HMS	HMS	HMS	HMS
35	6 35 50	6 38 44	6 41 39	6 44 36	6 47 36	6 50 38	6 53 43	6 56 51	7 0 1	7 3 15	7 6 33	7 8 3
36	6 37 13	6 40 13	6 43 15	6 46 20	6 49 27	6 52 36	6 55 48	6 59 4	7 2 22	7 5 44	7 9 10	7 10 44
37	6 38 37	6 41 45	6 45 54	6 48 6	6 51 20	6 54 37	6 57 57	7 1 20	7 4 47	7 8 17	7 11 51	7 13 29
38	6 40 5	6 43 19	6 46 36	6 49 55	6 53 17	6 56 41	7 0 9	7 3 40	7 7 15	7 10 54	7 14 37	7 16 19
39	6 41 34	6 44 56	6 48 20	6 51 47	6 55 17	6 58 49	7 2 25	7 6 5	7 9 48	7 13 36	7 17 28	7 19 14
40	6 43 6	6 46 36	6 50 8	6 53 42	6 57 20	7 1 1	7 4 46	7 8 34	7 12 26	7 16 23	7 20 25	7 22 16
41	6 44 41	6 48 18	6 51 58	6 55 41	6 59 28	7 3 17	7 7 10	7 12 8	7 15 10	7 19 16	7 23 28	7 25 23
42	6 46 19	6 50 4	6 53 53	6 57 44	7 1 39	7 5 38	7 9 40	7 13 47	7 17 58	7 22 15	7 26 37	7 28 37
43	6 47 59	6 51 54	6 55 51	6 59 51	7 3 55	7 8 3	7 12 15	7 16 31	7 20 53	7 25 20	7 29 53	7 31 57
44	6 49 44	6 53 47	6 57 53	7 2 2	7 6 16	7 10 33	7 14 55	7 19 22	7 23 54	7 28 32	7 33 16	7 35 26
45	6 51 32	6 55 44	6 59 59	7 4 18	7 8 41	7 13 9	7 17 41	7 22 19	7 27 2	7 31 52	7 36 48	7 39 4
46	6 53 24	6 57 45	7 2 10	7 6 39	7 11 13	7 15 51	7 20 34	7 25 23	7 30 18	7 35 19	7 40 28	7 42 50
47	6 55 20	6 59 51	7 4 26	7 9 6	7 13 50	7 18 39	7 23 33	7 28 34	7 33 41	7 38 56	7 44 18	7 46 46
48	6 57 20	7 2 2	7 6 48	7 11 38	7 16 33	7 21 34	7 26 41	7 31 54	7 37 14	7 42 42	7 48 19	7 50 53
49	6 59 26	7 4 18	7 9 15	7 14 17	7 19 24	7 24 37	7 29 56	7 35 27	7 40 56	7 46 39	7 52 30	7 55 12
50	7 1 36	7 6 40	7 11 49	7 17 3	7 22 22	7 27 48	7 33 20	7 39 1	7 44 49	7 50 47	7 56 55	7 59 44
51	7 3 53	7 9 9	7 14 29	7 19 56	7 25 28	7 31 8	7 36 54	7 42 50	7 48 54	7 55 8	8 1 33	8 4 31
52	7 6 16	7 11 44	7 17 17	7 22 57	7 28 44	7 34 37	7 40 39	7 46 50	7 53 11	7 59 43	8 6 27	8 9 33
53	7 8 45	7 14 26	7 20 14	7 26 8	7 32 9	7 38 18	7 44 36	7 51 4	7 57 43	8 4 34	8 11 38	8 14 54
54	7 11 22	7 17 17	7 23 19	7 29 28	7 35 45	7 42 10	7 48 46	7 55 32	8 2 30	8 9 41	8 17 8	8 20 35
55	7 14 7	7 20 17	7 26 34	7 32 59	7 39 32	7 46 16	7 53 9	8 0 15	8 7 34	8 15 9	8 23 0	8 26 38
56	7 17 0	7 23 36	7 30 0	7 36 42	7 43 33	7 50 35	7 57 49	8 5 17	8 12 59	8 20 58	8 29 16	8 33 7
57	7 20 4	7 26 46	7 33 38	7 40 38	7 47 49	7 55 11	8 2 47	8 10 38	8 18 45	8 27 11	8 36 0	8 40 6
58	7 23 18	7 30 19	7 37 28	7 44 49	7 52 20	8 0 5	8 8 5	8 16 21	8 24 56	8 33 54	8 43 16	8 47 38
59	7 26 44	7 34 4	7 41 34	7 49 16	7 57 10	8 5 19	8 13 45	8 22 30	8 31 36	8 41 8	8 51 9	8 55 51
60	7 30 23	7 38 4	7 45 56	7 54 1	8 2 20	8 10 56	8 19 51	8 29 8	8 38 50	8 49 1	8 59 47	9 4 51
61	7 34 17	7 42 20	7 50 37	7 59 7	8 7 54	8 17 0	8 26 27	8 36 19	8 46 41	8 57 39	9 9 18	9 14 49
62	7 38 11	7 46 55	7 55 38	8 4 36	8 13 54	8 23 32	8 33 37	8 44 10	8 55 19	9 7 10	9 19 54	9 25 59
63	7 42 56	7 51 51	8 1 3	8 10 32	8 20 24	8 30 40	8 41 26	8 52 47	9 4 52	9 17 49	9 31 53	9 38 40
64	7 47 46	7 57 11	8 6 55	8 16 59	8 27 29	8 38 29	8 50 4	9 2 21	9 15 32	9 29 51	9 45 40	9 53 26
65	7 53 0	8 2 58	8 13 18	8 24 2	8 35 16	8 47 6	8 59 38	9 13 4	9 27 38	9 43 43	10 1 58	10 11 11
66	7 58 42	8 9 17	8 20 18	8 31 47	8 43 52	8 56 41	9 10 23	9 25 14	9 41 37	10 0 11	10 22 11	10 33 53
67	8 4 56	8 16 13	8 28 0	8 40 32	8 53 28	9 7 28	9 22 38	9 39 20	9 58 15	10 20 38	10 40 45	11 15 54
68	8 8 38	8 20 20	8 32 36	8 45 31	8 59 15	9 14 2	9 30 10	9 48 10	10 8 58	10 34 38	11 12 27	12 0 0

NB—The Apparent Time of Sunset, when latitude and declination are of different names or the Apparent Time of Sunrise, when latitude and declination are of the same name is obtained by deducting the tabular figures from 12 hours



Table V.—Equation of Time at Greenwich Apparent Noon, as applied to Apparent Time to get the equivalent Mean-Time—(Contd)

July			August			September			October			November			December		
Long	Eq of T		Long	Eq of T		Long	Eq of T		Long	Eq of T		Long	Eq of T		Long	Eq of T	
	M	S		M	S		M	S		M	S		M	S		M	S
98°	3	21	128°	6	15	159°	0	0	187°	9	50	218°	16	19	249°	10	56
99	3	23	129	6	12	160	0	25	188	10	15	219	16	20	250	10	34
100	3	46	130	6	8	161	0	45	189	10	25	220	16	21	251	10	10
101	3	58	131	6	3	162	1	6	190	10	44	221	16	21	252	9	46
102	4	10	132	5	57	163	1	22	191	11	13	222	16	21	253	9	26
103	4	21	133	5	51	164	1	47	192	11	33	223	16	16	254	8	57
104	4	31	134	5	45	165	2	8	193	11	47	224	16	17	255	8	33
105	4	41	135	5	37	166	2	29	194	12	7	225	16	14	256	8	7
106	4	52	136	5	26	167	2	49	195	12	25	226	16	10	257	7	39
107	4	59	137	5	21	168	3	11	196	12	41	227	16	5	258	7	14
108	5	10	138	5	11	169	3	33	197	12	57	228	16	0	259	6	47
109	5	19	139	5	2	170	3	55	198	13	13	229	15	51	260	6	20
110	5	27	140	4	51	171	4	17	199	13	2	230	15	47	261	5	57
111	5	31	141	4	10	172	4	38	200	13	43	231	15	38	262	5	25
112	5	1	142	4	2	173	5	0	201	13	57	232	15	29	263	4	56
113	5	4	143	4	15	174	5	22	202	14	11	233	15	19	264	4	28
114	5	5	144	4	4	175	5	44	203	14	21	234	15	9	265	3	53
115	6	0	145	3	50	176	6	0	204	14	37	235	14	58	266	3	30
116	6	4	146	3	36	177	6	27	205	14	48	236	14	45	267	3	1
117	6	8	147	3	21	178	6	49	206	15	0	237	14	32	268	2	32
118°	6	12	148	3	7	179	7	10	207	15	10	238	14	19	269	2	2
119	6	15	149	2	51	180	7	31	208	15	20	239	14	4	270	1	33
120	6	16	150	2	35	181	7	53	209	15	29	240	13	48	271	1	3
121	6	20	151	2	19	182	8	14	210	15	38	241	13	32	272	0	34
122	6	21	152	2	2	183	8	35	211	15	45	242	13	15	273	0	4
123	6	22	153	1	46	184	8	56	212	15	53	243	12	56	274	0	25
124	6	21	154	1	28	185	9	16	213	15	59	244	12	38	275	0	54
125	6	20	155	1	10	186	9	36	214	16	4	245	12	19	276	1	21
126	6	19	156	0	52				215	16	9	246	12	0	277	1	40
127	6	17	157	0	34				216	16	13	247	11	39	278	2	20
			158	0	14				217	16	16	248	11	17	279	3	0

Table VI—Ternary Proportional Logarithms.

	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
	Infinite	2 25327	1 93424	1 77515	1 63521	1 53630	1 47712	1 41017	1 35218	1 30103	1 25527
1	4 03342	2 21809	1 95064	1 77575	1 63141	1 53496	1 47532	1 40914	1 35123	1 30023	1 25455
2	3 73239	2 24101	1 94062	1 77333	1 62961	1 53312	1 47472	1 40811	1 35035	1 29942	1 25383
3	3 55630	2 23403	1 94336	1 77697	1 61792	1 53198	1 47352	1 40704	1 34948	1 29872	1 25311
4	3 43136	2 22724	1 94000	1 76661	1 64603	1 54055	1 47212	1 40606	1 34859	1 29782	1 25239
5	3 33445	2 22051	1 93651	1 76625	1 64425	1 54012	1 47113	1 40503	1 34768	1 29703	1 25167
6	3 25527	2 21393	1 93305	1 76391	1 64249	1 53770	1 46994	1 40401	1 34679	1 29623	1 25095
7	3 18433	2 20735	1 92962	1 76159	1 64073	1 53629	1 46876	1 40300	1 34592	1 29544	1 25024
8	3 11033	2 20091	1 92621	1 75927	1 63857	1 53487	1 46758	1 40193	1 34500	1 29464	1 24952
9	3 07914	2 19457	1 92283	1 75696	1 63722	1 53347	1 46640	1 40097	1 34411	1 29385	1 24881
10	3 03342	2 18833	1 91948	1 75467	1 63549	1 53206	1 46522	1 39976	1 34323	1 29306	1 24809
11	2 99203	2 18217	1 91615	1 75239	1 63375	1 53066	1 46405	1 39823	1 34234	1 29227	1 24735
12	2 95424	2 17609	1 91295	1 75012	1 63202	1 52927	1 46289	1 39704	1 34146	1 29148	1 24667
13	2 91948	2 17010	1 90957	1 74787	1 63030	1 52789	1 46171	1 39594	1 34059	1 29070	1 24596
14	2 88730	2 16419	1 90632	1 74562	1 62859	1 52649	1 46055	1 39503	1 33970	1 28991	1 24526
15	2 85733	2 15836	1 90309	1 74339	1 62688	1 52511	1 45938	1 39403	1 33882	1 28913	1 24455
16	2 82930	2 15261	1 89988	1 74117	1 62518	1 52374	1 45824	1 39294	1 33794	1 28835	1 24384
17	2 80297	2 14693	1 89670	1 73896	1 62349	1 52236	1 45708	1 39204	1 33707	1 28757	1 24314
18	2 77815	2 14133	1 89354	1 73676	1 62180	1 52100	1 45593	1 39115	1 33619	1 28679	1 24244
19	2 75467	2 13580	1 89041	1 73457	1 62012	1 52063	1 45478	1 39006	1 33532	1 28601	1 24173
20	2 73219	2 13033	1 88730	1 73239	1 61845	1 52027	1 45364	1 38907	1 33445	1 28524	1 24103
21	2 71120	2 12494	1 88420	1 73023	1 61678	1 52002	1 45250	1 38809	1 33359	1 28446	1 24033
22	2 69100	2 11961	1 88114	1 72807	1 61512	1 52057	1 45136	1 38800	1 33272	1 28369	1 23963
23	2 67170	2 11435	1 87809	1 72593	1 61347	1 52022	1 45022	1 38702	1 33186	1 28292	1 23894
24	2 65321	2 10914	1 87506	1 72379	1 61182	1 52028	1 44909	1 38604	1 33099	1 28215	1 23824
25	2 63548	2 10400	1 87206	1 72167	1 61018	1 52154	1 44796	1 38506	1 33013	1 28138	1 23754
26	2 61845	2 09893	1 86907	1 71956	1 60854	1 52021	1 44684	1 38409	1 32927	1 28061	1 23685
27	2 60206	2 09390	1 86611	1 71743	1 60691	1 51883	1 44571	1 38312	1 32842	1 27984	1 23616
28	2 58627	2 08894	1 86316	1 71536	1 60529	1 51755	1 44459	1 38215	1 32756	1 27909	1 23546
29	2 57103	2 08403	1 86024	1 71328	1 60367	1 51623	1 44347	1 38119	1 32671	1 27831	1 23477
30	2 55630	2 07918	1 85733	1 71120	1 60206	1 51491	1 44236	1 38021	1 32585	1 27755	1 23408
31	2 54206	2 07438	1 85445	1 70914	1 60015	1 51360	1 44125	1 37925	1 32500	1 27679	1 23339
32	2 52827	2 06964	1 85158	1 70709	1 59835	1 51229	1 44014	1 37829	1 32415	1 27603	1 23271
33	2 51491	2 06494	1 84873	1 70504	1 59727	1 51098	1 43903	1 37733	1 32331	1 27527	1 23202
34	2 50194	2 06030	1 84590	1 70301	1 59607	1 50968	1 43793	1 37637	1 32246	1 27451	1 23133
35	2 48936	2 05570	1 84309	1 70099	1 59409	1 50838	1 43683	1 37541	1 32162	1 27376	1 23065
36	2 47712	2 05115	1 84030	1 69897	1 59251	1 50708	1 43573	1 37446	1 32077	1 27300	1 22997
37	2 46522	2 04665	1 83752	1 69696	1 59094	1 50579	1 43463	1 37351	1 31993	1 27225	1 22928
38	2 45364	2 04220	1 83477	1 69497	1 58938	1 50451	1 43354	1 37256	1 31909	1 27150	1 22860
39	2 44236	2 03779	1 83203	1 69298	1 58782	1 50322	1 43245	1 37161	1 31826	1 27075	1 22792
40	2 43136	2 03342	1 82930	1 69100	1 58627	1 50194	1 43136	1 37067	1 31742	1 27000	1 22724
41	2 42064	2 02910	1 82660	1 68903	1 58472	1 50067	1 43028	1 36972	1 31659	1 26925	1 22657
42	2 41017	2 02482	1 82391	1 68707	1 58317	1 49940	1 42920	1 36878	1 31575	1 26850	1 22589
43	2 39996	2 02060	1 82124	1 68512	1 58164	1 49813	1 42812	1 36784	1 31492	1 26776	1 22521
44	2 38997	2 01639	1 81858	1 68318	1 58011	1 49687	1 42704	1 36691	1 31409	1 26701	1 22454
45	2 38021	2 01223	1 81594	1 68124	1 57858	1 49560	1 42597	1 36597	1 31326	1 26627	1 22386
46	2 37067	2 00812	1 81332	1 67932	1 57706	1 49435	1 42490	1 36504	1 31244	1 26553	1 22319
47	2 36133	2 00404	1 81071	1 67740	1 57554	1 49309	1 42383	1 36411	1 31161	1 26479	1 22252
48	2 35218	2 00000	1 80811	1 67549	1 57403	1 49184	1 42276	1 36318	1 31079	1 26405	1 22185
49	2 34323	1 99600	1 80554	1 67359	1 57253	1 49060	1 42170	1 36225	1 30997	1 26331	1 22118
50	2 33445	1 99203	1 80297	1 67170	1 57103	1 48936	1 42064	1 36133	1 30915	1 26257	1 22051
51	2 32585	1 98810	1 80043	1 66981	1 56953	1 48812	1 41958	1 36040	1 30833	1 26184	1 21984
52	2 31742	1 98421	1 79790	1 66794	1 56804	1 48688	1 41853	1 35948	1 30751	1 26110	1 21918
53	2 30915	1 98035	1 79538	1 66607	1 56656	1 48565	1 41747	1 35856	1 30670	1 26037	1 21851
54	2 30103	1 97652	1 79287	1 66421	1 56508	1 48442	1 41642	1 35765	1 30588	1 25964	1 21785
55	2 29306	1 97273	1 79039	1 66236	1 56360	1 48320	1 41538	1 35673	1 30507	1 25891	1 21718
56	2 28524	1 96897	1 78791	1 66051	1 56213	1 48197	1 41433	1 35582	1 30426	1 25818	1 21652
57	2 27755	1 96524	1 78545	1 65868	1 56067	1 48076	1 41329	1 35491	1 30345	1 25745	1 21586
58	2 27000	1 96154	1 78300	1 65685	1 55921	1 47954	1 41225	1 35400	1 30264	1 25672	1 21520
59	2 26257	1 95788	1 78057	1 65503	1 55775	1 47833	1 41121	1 35309	1 30183	1 25600	1 21454
60	2 25527	1 95424	1 77815	1 65321	1 55630	1 47712	1 41017	1 35218	1 30103	1 25527	1 21388

Table VI—Ternary Proportional Logarithms—(Contd)

	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	21°
0	1.21154	1.17629	1.14133	1.10714	1.07319	1.03915	1.02152	1.00000	97652	95424	93305
1	1.21322	1.17740	1.14277	1.10831	1.07400	1.03970	1.02197	0.99720	97614	95394	93271
2	1.21477	1.17845	1.14322	1.10891	1.07432	1.03995	1.02217	0.99730	97576	95352	93231
3	1.21621	1.17942	1.14400	1.10970	1.07474	1.04040	1.02235	0.99740	97538	95316	93202
4	1.21765	1.18039	1.14479	1.11049	1.07518	1.04113	1.02252	0.99750	97500	95290	93168
5	1.21908	1.18129	1.14555	1.11127	1.07563	1.04160	1.02270	0.99759	97462	95244	93133
6	1.22051	1.18219	1.14630	1.11205	1.07608	1.04205	1.02284	0.99757	97424	95205	93099
7	1.22193	1.18309	1.14705	1.11283	1.07652	1.04250	1.02295	0.99759	97386	95172	93065
8	1.22336	1.18399	1.14780	1.11361	1.07697	1.04295	1.02305	0.99759	97348	95137	93030
9	1.22479	1.18489	1.14855	1.11439	1.07742	1.04340	1.02316	0.99759	97310	95100	92996
10	1.22621	1.18579	1.14930	1.11517	1.07787	1.04385	1.02325	0.99759	97273	95064	92962
11	1.22764	1.18669	1.15005	1.11595	1.07832	1.04430	1.02335	0.99759	97235	95025	92928
12	1.22907	1.18759	1.15080	1.11673	1.07877	1.04475	1.02345	0.99759	97197	94992	92894
13	1.23050	1.18849	1.15155	1.11751	1.07922	1.04520	1.02355	0.99759	97159	94956	92860
14	1.23193	1.18939	1.15230	1.11829	1.07967	1.04565	1.02365	0.99759	97122	94921	92825
15	1.23336	1.19029	1.15305	1.11907	1.08012	1.04610	1.02375	0.99759	97084	94885	92791
16	1.23479	1.19119	1.15380	1.11985	1.08057	1.04655	1.02385	0.99759	97047	94849	92757
17	1.23621	1.19209	1.15455	1.12063	1.08102	1.04700	1.02395	0.99759	97009	94813	92723
18	1.23764	1.19299	1.15530	1.12141	1.08147	1.04745	1.02405	0.99759	96972	94777	92689
19	1.23907	1.19389	1.15605	1.12219	1.08192	1.04790	1.02415	0.99759	96934	94742	92655
20	1.24050	1.19479	1.15680	1.12297	1.08237	1.04835	1.02425	0.99759	96897	94706	92621
21	1.24193	1.19569	1.15755	1.12375	1.08282	1.04880	1.02435	0.99759	96859	94671	92587
22	1.24336	1.19659	1.15830	1.12453	1.08327	1.04925	1.02445	0.99759	96822	94635	92553
23	1.24479	1.19749	1.15905	1.12531	1.08372	1.04970	1.02455	0.99759	96784	94600	92520
24	1.24621	1.19839	1.15980	1.12609	1.08417	1.05015	1.02465	0.99759	96747	94564	92486
25	1.24764	1.19929	1.16055	1.12687	1.08462	1.05060	1.02475	0.99759	96710	94529	92452
26	1.24907	1.20019	1.16130	1.12765	1.08507	1.05105	1.02485	0.99759	96672	94493	92418
27	1.25050	1.20109	1.16205	1.12843	1.08552	1.05150	1.02495	0.99759	96635	94458	92385
28	1.25193	1.20199	1.16280	1.12921	1.08597	1.05195	1.02505	0.99759	96597	94423	92351
29	1.25336	1.20289	1.16355	1.13000	1.08642	1.05240	1.02515	0.99759	96560	94387	92317
30	1.25479	1.20379	1.16430	1.13078	1.08687	1.05285	1.02525	0.99759	96522	94352	92283
31	1.25621	1.20469	1.16505	1.13156	1.08732	1.05330	1.02535	0.99759	96485	94317	92250
32	1.25764	1.20559	1.16580	1.13234	1.08777	1.05375	1.02545	0.99759	96447	94281	92216
33	1.25907	1.20649	1.16655	1.13312	1.08822	1.05420	1.02555	0.99759	96410	94246	92183
34	1.26050	1.20739	1.16730	1.13390	1.08867	1.05465	1.02565	0.99759	96372	94211	92149
35	1.26193	1.20829	1.16805	1.13468	1.08912	1.05510	1.02575	0.99759	96335	94176	92115
36	1.26336	1.20919	1.16880	1.13546	1.08957	1.05555	1.02585	0.99759	96297	94141	92082
37	1.26479	1.21009	1.16955	1.13624	1.09002	1.05600	1.02595	0.99759	96260	94105	92048
38	1.26621	1.21099	1.17030	1.13702	1.09047	1.05645	1.02605	0.99759	96222	94070	92015
39	1.26764	1.21189	1.17105	1.13780	1.09092	1.05690	1.02615	0.99759	96185	94035	91981
40	1.26907	1.21279	1.17180	1.13858	1.09137	1.05735	1.02625	0.99759	96147	94000	91948
41	1.27050	1.21369	1.17255	1.13936	1.09182	1.05780	1.02635	0.99759	96110	93965	91915
42	1.27193	1.21459	1.17330	1.14014	1.09227	1.05825	1.02645	0.99759	96072	93930	91881
43	1.27336	1.21549	1.17405	1.14092	1.09272	1.05870	1.02655	0.99759	96035	93895	91848
44	1.27479	1.21639	1.17480	1.14170	1.09317	1.05915	1.02665	0.99759	96000	93860	91815
45	1.27621	1.21729	1.17555	1.14248	1.09362	1.05960	1.02675	0.99759	95962	93825	91781
46	1.27764	1.21819	1.17630	1.14326	1.09407	1.06005	1.02685	0.99759	95925	93791	91748
47	1.27907	1.21909	1.17705	1.14404	1.09452	1.06050	1.02695	0.99759	95887	93756	91715
48	1.28050	1.21999	1.17780	1.14482	1.09497	1.06095	1.02705	0.99759	95850	93721	91682
49	1.28193	1.22089	1.17855	1.14560	1.09542	1.06140	1.02715	0.99759	95812	93686	91648
50	1.28336	1.22179	1.17930	1.14638	1.09587	1.06185	1.02725	0.99759	95775	93651	91615
51	1.28479	1.22269	1.18005	1.14716	1.09632	1.06230	1.02735	0.99759	95737	93617	91582
52	1.28621	1.22359	1.18080	1.14794	1.09677	1.06275	1.02745	0.99759	95700	93582	91549
53	1.28764	1.22449	1.18155	1.14872	1.09722	1.06320	1.02755	0.99759	95662	93547	91516
54	1.28907	1.22539	1.18230	1.14950	1.09767	1.06365	1.02765	0.99759	95625	93513	91483
55	1.29050	1.22629	1.18305	1.15028	1.09812	1.06410	1.02775	0.99759	95587	93478	91450
56	1.29193	1.22719	1.18380	1.15106	1.09857	1.06455	1.02785	0.99759	95550	93443	91417
57	1.29336	1.22809	1.18455	1.15184	1.09902	1.06500	1.02795	0.99759	95512	93409	91384
58	1.29479	1.22899	1.18530	1.15262	1.09947	1.06545	1.02805	0.99759	95475	93374	91351
59	1.29621	1.22989	1.18605	1.15340	1.09992	1.06590	1.02815	0.99759	95437	93340	91318
60	1.29764	1.23079	1.18680	1.15418	1.10037	1.06635	1.02825	0.99759	95400	93305	91285



Table VI—Ternary Proportional Logarithms—(Contd.)

	22°	23°	24°	25°	26°	27°	28°	29°	30°	31°	32°	33°	34°	35°	36°
0°	91285	89354	87506	85733	84030	82391	80811	79287	77815	76391	75012	73676	72379	71120	69897
1	91252	89323	87476	85704	84002	82364	80786	79262	77791	76368	74990	73654	72358	71100	69877
2	91219	89292	87446	85675	83974	82337	80760	79238	77767	76344	74967	73632	72337	71079	69857
3	91186	89260	87416	85646	83946	82311	80734	79213	77743	76321	74944	73610	72316	71058	69837
4	91154	89229	87386	85618	83919	82284	80708	79188	77719	76298	74922	73588	72294	71038	69817
5	91121	89197	87356	85589	83891	82257	80682	79163	77695	76274	74899	73566	72273	71017	69797
6	91088	89166	87326	85560	83863	82230	80657	79138	77671	76251	74877	73544	72252	70997	69777
7	91055	89135	87296	85531	83835	82204	80631	79113	77647	76228	74854	73523	72231	70976	69756
8	91023	89103	87266	85502	83808	82177	80605	79088	77623	76205	74832	73501	72209	70955	69736
9	90990	89072	87236	85473	83780	82150	80579	79063	77599	76181	74809	73479	72188	70935	69716
10	90957	89041	87206	85445	83752	82124	80554	79039	77575	76158	74787	73457	72167	70914	69696
11	90925	89010	87176	85416	83725	82097	80523	79014	77551	76135	74764	73435	72146	70894	69676
12	90892	88978	87146	85387	83697	82070	80502	78989	77527	76112	74742	73413	72125	70873	69656
13	90859	88947	87116	85358	83667	82044	80477	78964	77503	76089	74719	73392	72103	70852	69636
14	90827	88916	87086	85330	83642	82017	80451	78939	77479	76065	74697	73370	72082	70832	69616
15	90794	88885	87056	85301	83614	81991	80425	78915	77455	76042	74674	73348	72061	70811	69596
16	90762	88854	87026	85272	83587	81964	80400	78890	77431	76019	74652	73326	72040	70791	69576
17	90729	88823	86996	85244	83559	81938	80374	78865	77407	75996	74630	73305	72019	70770	69557
18	90697	88792	86967	85215	83532	81911	80349	78840	77383	75973	74607	73283	71998	70750	69537
19	90664	88761	86937	85187	83504	81884	80323	78816	77359	75950	74585	73261	71977	70729	69517
20	90632	88730	86907	85158	83477	81858	80297	78791	77335	75927	74562	73239	71956	70709	69497
21	90599	88699	86877	85129	83449	81832	80272	78766	77311	75903	74540	73218	71835	70688	69477
22	90567	88668	86848	85101	83422	81805	80246	78742	77288	75880	74517	73196	71814	70668	69457
23	90535	88637	86818	85072	83394	81779	80221	78717	77264	75857	74495	73174	71792	70647	69437
24	90503	88606	86788	85044	83367	81752	80195	78693	77240	75834	74473	73153	71771	70627	69417
25	90470	88575	86759	85015	83339	81726	80170	78663	77216	75811	74450	73131	71750	70606	69397
26	90438	88544	86729	84987	83312	81699	80144	78643	77192	75788	74428	73109	71729	70586	69377
27	90406	88513	86699	84958	83285	81673	80119	78619	77169	75765	74406	73088	71708	70566	69358
28	90373	88482	86670	84930	83257	81647	80094	78594	77145	75742	74383	73066	71687	70545	69338
29	90341	88451	86640	84902	83230	81620	80068	78570	77121	75719	74361	73044	71666	70525	69318
30	90309	88420	86611	84873	83203	81594	80043	78545	77097	75696	74339	73023	71645	70504	69298
31	90277	88390	86581	84845	83175	81568	80017	78521	77074	75673	74317	73001	71624	70484	69278
32	90245	88359	86552	84816	83148	81541	79992	78496	77050	75650	74294	72980	71603	70464	69258
33	90213	88328	86522	84788	83121	81515	79967	78472	77026	75627	74272	72958	71582	70443	69239
34	90181	88297	86493	84760	83094	81489	79941	78447	77002	75604	74250	72936	71562	70403	69219
35	90148	88267	86463	84732	83066	81463	79916	78423	76979	75581	74228	72915	71541	70403	69199
36	90116	88236	86434	84703	83039	81436	79891	78398	76955	75559	74205	72893	71620	70382	69179
37	90084	88205	86404	84673	83012	81410	79865	78374	76931	75536	74183	72872	71599	70362	69159
38	90052	88173	86374	84647	82985	81384	79840	78349	76908	75513	74161	72850	71578	70342	69140
39	90020	88144	86346	84619	82958	81358	79815	78325	76884	75490	74139	72829	71557	70321	69120
40	89988	88114	86316	84590	82930	81332	79790	78300	76861	75467	74117	72807	71536	70301	69100
41	89957	88083	86287	84562	82903	81305	79764	78276	76837	75444	74095	72786	71515	70281	69080
42	89925	88052	86258	84534	82876	81279	79739	78252	76813	75421	74072	72764	71494	70260	69061
43	89893	88022	86228	84506	82849	81253	79714	78227	76790	75398	74050	72743	71474	70230	69041
44	89861	87991	86199	84478	82822	81227	79689	78202	76765	75373	74025	72718	71449	70200	69021
45	89829	87961	86170	84450	82795	81201	79663	78179	76743	75353	74006	72700	71432	70200	69002
46	89797	87930	86140	84421	82768	81175	79635	78154	76719	75330	73984	72678	71411	70179	68982
47	89766	87900	86111	84393	82741	81149	79613	78130	76696	75307	73962	72657	71390	70159	68962
48	89734	87870	86082	84365	82714	81123	79588	78106	76672	75283	73940	72636	71369	70139	68942
49	89702	87839	86053	84337	82687	81097	79563	78081	76649	75262	73918	72614	71349	70119	68923
50	89670	87809	86024	84309	82660	81071	79538	78057	76625	75239	73926	72593	71328	70099	68903
51	89639	87778	85995	84281	82633	81045	79513	78033	76602	75216	73874	72571	71307	70078	68884
52	89607	87748	85965	84253	82606	81019	79488	78009	76578	75194	73852	72550	71286	70058	68864
53	89575	87718	85936	84225	82579	80993	79463	77984	76553	75171	73830	72527	71265	70038	68844
54	89544	87687	85907	84197	82552	80967	79437	77960	76531	75148	73808	72507	71245	70018	68825
55	89512	87657	85878	84169	82525	80941	79412	77936	76508	75126	73786	72486	71224	69999	68805
56	89481	87627	85849	84141	82498	80915	79387	77912	76485	75103	73764	72465	71203	69977	68785
57	89449	87597	85820	84114	82471	80889	79362	77888	76461	75080	73742	72443	71183	69957	68766
58	89417	87566	85791	84086	82445	80863	79337	77863	76438	75058	73720	72422	71162	69937	68746
59	89386	87536	85762	84058	82418	80837	79312	77839	76414	75035	73698	72401	71141	69917	68727
60	89354	87506	85733	84030	82391	80811	79287	77815	76391	75012	73676	72379	71120	69897	68707

Table VI—Ternary Proportional Logarithms—(Contd.)

	37°	38°	39°	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	51°
0°	68707	67549	66421	65321	64249	63202	62180	61182	60206	59251	58317	57403	56508	55630	54770
1	68688	67530	66402	65303	64231	63185	62161	61166	60190	59236	58302	57388	56493	55616	54756
2	68668	67511	66384	65285	64214	63168	62147	61149	60174	59220	58287	57373	56478	55601	54742
3	68648	67492	66365	65267	64196	63151	62130	61133	60158	59204	58271	57358	56463	55587	54728
4	68629	67473	66347	65249	64178	63133	62113	61116	60142	59189	58256	57343	56449	55572	54714
5	68609	67454	66328	65231	64161	63116	62096	61100	60126	59173	58241	57328	56434	55558	54699
6	68590	67435	66310	65213	64143	63099	62080	61083	60110	59157	58225	57313	56419	55543	54685
7	68570	67416	66291	65195	64125	63082	62063	61067	60094	59141	58210	57298	56404	55529	54671
8	68551	67397	66273	65177	64108	63065	62046	61051	60078	59126	58194	57283	56390	55515	54657
9	68531	67378	66254	65159	64090	63047	62029	61034	60061	59110	58179	57268	56375	55500	54643
10	68512	67359	66236	65141	64073	63030	62012	61018	60045	59094	58164	57253	56360	55486	54629
11	68492	67340	66217	65123	64055	63013	61996	61001	60029	59079	58149	57238	56345	55471	54614
12	68473	67321	66199	65105	64038	62996	61979	60985	60013	59063	58133	57223	56331	55457	54600
13	68454	67302	66180	65087	64020	62979	61962	60969	59997	59047	58118	57208	56316	55442	54586
14	68434	67283	66162	65069	64002	62962	61945	60952	59981	59032	58102	57193	56301	55428	54572
15	68415	67264	66143	65051	63985	62945	61929	60936	59965	59016	58087	57178	56287	55414	54558
16	68395	67245	66125	65033	63967	62927	61912	60919	59949	59000	58072	57163	56272	55399	54544
17	68376	67226	66106	65015	63950	62910	61895	60903	59933	58985	58056	57148	56257	55385	54530
18	68356	67207	66088	64997	63932	62893	61878	60887	59917	58969	58041	57133	56243	55370	54516
19	68337	67188	66070	64979	63915	62876	61862	60871	59901	58954	58026	57118	56228	55356	54501
20	68318	67170	66051	64961	63897	62859	61845	60854	59885	58938	58011	57103	56213	55342	54487
21	68298	67151	66033	64943	63880	62842	61828	60838	59870	58922	57995	57088	56199	55327	54473
22	68279	67132	66014	64925	63862	62825	61812	60822	59854	58907	57980	57073	56184	55313	54459
23	68259	67113	65996	64907	63845	62808	61795	60805	59838	58891	57965	57058	56169	55299	54445
24	68240	67094	65978	64889	63827	62791	61778	60789	59822	58875	57949	57043	56155	55284	54431
25	68221	67075	65959	64871	63810	62774	61762	60773	59806	58860	57934	57028	56140	55270	54417
26	68201	67056	65941	64853	63792	62757	61745	60756	59790	58844	57919	57013	56125	55255	54403
27	68182	67038	65923	64835	63775	62739	61728	60740	59774	58828	57904	56998	56111	55241	54389
28	68163	67019	65904	64818	63757	62722	61712	60724	59758	58813	57888	56983	56096	55227	54375
29	68144	67000	65886	64800	63740	62705	61695	60708	59742	58798	57873	56968	56081	55212	54361
30	68124	66981	65868	64782	63722	62688	61678	60691	59726	58782	57858	56953	56067	55198	54347
31	68105	66962	65849	64764	63705	62671	61662	60675	59710	58766	57843	56938	56052	55184	54332
32	68086	66944	65831	64746	63688	62654	61645	60659	59694	58751	57827	56923	56037	55169	54318
33	68066	66925	65813	64728	63670	62637	61628	60642	59678	58735	57812	56908	56023	55155	54304
34	68047	66906	65794	64710	63653	62620	61612	60626	59663	58720	57797	56893	56008	55141	54290
35	68028	66887	65776	64692	63635	62603	61595	60610	59647	58704	57782	56879	55994	55127	54276
36	68008	66869	65758	64675	63618	62586	61579	60594	59631	58689	57767	56864	55979	55112	54262
37	67989	66850	65739	64657	63601	62569	61562	60578	59615	58673	57751	56849	55964	55098	54248
38	67970	66831	65721	64639	63583	62552	61545	60561	59599	58657	57736	56834	55950	55084	54234
39	67951	66812	65703	64621	63566	62535	61529	60545	59583	58642	57721	56819	55935	55069	54220
40	67932	66794	65685	64603	63548	62518	61512	60529	59567	58627	57706	56804	55921	55055	54206
41	67912	66775	65666	64586	63531	62501	61496	60513	59551	58611	57691	56789	55906	55041	54192
42	67893	66756	65648	64568	63514	62484	61479	60496	59536	58596	57676	56774	55892	55026	54178
43	67874	66737	65630	64550	63496	62468	61463	60480	59520	58580	57660	56759	55877	55012	54164
44	67855	66719	65612	64532	63479	62451	61446	60464	59504	58565	57645	56745	55862	54998	54150
45	67836	66700	65594	64514	63462	62434	61429	60448	59488	58549	57630	56730	55848	54984	54136
46	67816	66681	65575	64497	63444	62417	61413	60432	59472	58534	57615	56715	55833	54969	54122
47	67797	66663	65557	64479	63427	62400	61396	60416	59457	58518	57600	56700	55819	54955	54108
48	67778	66644	65539	64461	63410	62383	61380	60399	59441	58503	57584	56685	55804	54941	54094
49	67759	66625	65521	64443	63392	62366	61363	60383	59425	58487	57569	56670	55790	54927	54080
50	67740	66607	65503	64426	63375	62349	61347	60367	59409	58472	57554	56656	55775	54912	54066
51	67721	66588	65484	64408	63358	62332	61330	60351	59393	58456	57539	56641	55761	54898	54052
52	67702	66570	65466	64390	63340	62315	61314	60335	59378	58441	57524	56626	55746	54884	54038
53	67683	66551	65448	64373	63323	62299	61297	60319	59362	58425	57509	56611	55732	54870	54024
54	67663	66532	65430	64355	63306	62282	61281	60303	59346	58410	57494	56596	55717	54855	54011
55	67644	66514	65412	64337	63289	62265	61264	60286	59330	58395	57479	56582	55703	54841	53997
56	67625	66495	65394	64320	63271	62248	61248	60270	59314	58379	57463	56567	55688	54827	53983
57	67606	66477	65376	64302	63254	62231	61231	60254	59299	58364	57448	56552	55674	54813	53969
58	67587	66458	65357	64284	63237	62214	61215	60238	59283	58348	57433	56537	55659	54799	53955
59	67568	66439	65339	64267	63219	62197	61198	60222	59267	58333	57418	56522	55645	54784	53941
60	67549	66421	65321	64249	63202	62180	61182	60206	59251	58317	57403	56508	55630	54770	53927

Table VI—Ternary Proportional Logarithms—(Contd.)

	52°	53°	54°	55°	56°	57°	58°	59°	60°	61°	62°	63°	64°	65°	66°
0	53927	53100	52268	51491	50708	49940	49184	48442	47712	46994	46288	45593	44909	44236	43573
1	53913	53086	52254	51478	50696	49927	49172	48430	47700	46982	46276	45582	44898	44225	43562
2	53899	53072	52241	51465	50683	49914	49159	48418	47688	46971	46265	45570	44887	44214	43551
3	53885	53059	52228	51452	50670	49902	49147	48405	47676	46959	46253	45559	44875	44203	43540
4	53871	53045	52234	51438	50657	49889	49135	48393	47664	46947	46241	45547	44864	44191	43529
5	53857	53031	52221	51425	50644	49876	49122	48381	47652	46935	46230	45536	44853	44180	43518
6	53843	53018	52208	51412	50631	49864	49110	48369	47640	46923	46218	45524	44841	44169	43507
7	53830	53004	52194	51399	50618	49851	49097	48356	47628	46911	46206	45513	44830	44158	43496
8	53816	52991	52181	51386	50605	49838	49083	48344	47616	46899	46195	45501	44819	44147	43485
9	53802	52977	52167	51373	50592	49826	49072	48332	47604	46888	46183	45490	44808	44136	43474
10	53788	52963	52154	51360	50579	49813	49060	48320	47592	46876	46171	45478	44796	44125	43463
11	53774	52950	52141	51346	50566	49800	49047	48307	47580	46864	46160	45467	44785	44114	43452
12	53760	52936	52127	51333	50554	49788	49035	48295	47568	46852	46148	45456	44774	44102	43441
13	53746	52922	52114	51320	50541	49775	49023	48283	47556	46840	46137	45444	44762	44091	43431
14	53732	52909	52101	51307	50528	49762	49010	48271	47544	46828	46125	45433	44751	44080	43420
15	53719	52895	52087	51294	50515	49750	48998	48258	47532	46817	46113	45421	44740	44069	43409
16	53705	52882	52074	51281	50502	49737	48985	48246	47520	46805	46102	45410	44729	44058	43398
17	53691	52868	52061	51268	50489	49724	48973	48234	47508	46793	46090	45398	44717	44047	43387
18	53677	52855	52047	51255	50476	49712	48960	48222	47496	46781	46078	45387	44706	44036	43376
19	53663	52841	52034	51242	50464	49699	48948	48210	47484	46769	46067	45375	44695	44025	43365
20	53649	52827	52021	51229	50451	49687	48936	48197	47472	46758	46055	45364	44684	44014	43354
21	53636	52814	52007	51215	50438	49674	48923	48185	47460	46746	46044	45353	44672	44003	43343
22	53622	52800	51994	51202	50425	49661	48911	48173	47448	46734	46032	45341	44661	43992	43332
23	53608	52787	51981	51189	50412	49649	48898	48161	47436	46722	46020	45330	44650	43981	43321
24	53594	52773	51967	51176	50399	49636	48885	48149	47424	46710	46009	45318	44639	43969	43310
25	53580	52760	51954	51163	50387	49623	48874	48136	47412	46699	45997	45307	44627	43958	43300
26	53567	52746	51941	51150	50374	49611	48861	48124	47400	46687	45986	45295	44616	43917	43289
27	53553	52732	51927	51139	50361	49598	48849	48112	47388	46675	45974	45284	44605	43906	43278
28	53539	52719	51914	51124	50348	49586	48836	48100	47376	46663	45962	45273	44594	43895	43267
29	53525	52705	51901	51111	50335	49573	48824	48088	47364	46652	45951	45261	44583	43884	43256
30	53511	52692	51888	51098	50322	49560	48812	48076	47352	46640	45939	45250	44571	43893	43245
31	53498	52678	51874	51085	50310	49548	48799	48063	47340	46628	45928	45238	44560	43882	43234
32	53484	52665	51861	51072	50297	49535	48787	48051	47328	46616	45916	45227	44549	43871	43223
33	53470	52651	51848	51059	50284	49523	48775	48039	47316	46604	45905	45216	44538	43860	43212
34	53456	52638	51835	51046	50271	49510	48762	48027	47304	46593	45893	45204	44526	43849	43203
35	53442	52624	51821	51033	50258	49498	48750	48015	47292	46581	45881	45193	44515	43848	43191
36	53429	52611	51808	51020	50246	49485	48737	48003	47280	46569	45870	45182	44504	43837	43180
37	53415	52597	51795	51007	50233	49472	48725	47990	47268	46557	45858	45170	44493	43826	43169
38	53401	52584	51781	50994	50220	49460	48713	47978	47256	46546	45847	45159	44482	43815	43158
39	53387	52570	51768	50981	50207	49447	48700	47966	47244	46534	45835	45147	44470	43804	43147
40	53374	52557	51755	50968	50194	49435	48688	47954	47232	46522	45824	45136	44459	43793	43136
41	53360	52543	51742	50955	50182	49422	48676	47942	47220	46510	45812	45125	44448	43782	43126
42	53346	52530	51729	50942	50169	49410	48663	47930	47208	46499	45800	45113	44437	43771	43115
43	53332	52516	51715	50930	50156	49397	48651	47918	47196	46487	45788	45102	44426	43760	43103
44	53319	52503	51702	50916	50143	49385	48639	47906	47185	46475	45777	45091	44414	43749	43093
45	53305	52489	51689	50903	50131	49372	48626	47893	47173	46464	45766	45079	44403	43738	43082
46	53291	52476	51676	50890	50118	49360	48614	47881	47161	46452	45754	45068	44392	43727	43071
47	53278	52462	51662	50877	50105	49347	48602	47869	47149	46440	45743	45057	44381	43716	43060
48	53264	52449	51649	50864	50092	49334	48590	47857	47137	46428	45731	45045	44370	43705	43050
49	53250	52436	51636	50851	50080	49322	48577	47845	47125	46417	45720	45034	44359	43694	43039
50	53236	52422	51623	50838	50067	49309	48565	47833	47113	46405	45708	45022	44347	43683	43028
51	53223	52409	51610	50825	50054	49297	48553	47821	47101	46393	45697	45011	44336	43672	43017
52	53209	52395	51596	50812	50041	49284	48540	47809	47089	46382	45686	45000	44325	43661	43006
53	53195	52382	51583	50799	50029	49272	48528	47797	47077	46370	45674	44988	44314	43650	42995
54	53182	52369	51570	50786	50016	49259	48516	47785	47065	46358	45662	44977	44303	43639	42985
55	53168	52355	51557	50773	50003	49247	48503	47772	47054	46346	45651	44966	44292	43628	42974
56	53154	52342	51544	50760	49991	49234	48491	47760	47042	46335	45639	44955	44280	43617	42963
57	53141	52328	51530	50747	49978	49222	48479	47748	47030	46323	45628	44944	44270	43606	42952
58	53127	52315	51517	50734	49965	49209	48467	47736	47018	46311	45616	44932	44258	43595	42941
59	53113	52301	51504	50721	49952	49197	48454	47724	47006	46300	45605	44921	44247	43584	42929
60	53100	52288	51491	50708	49940	49184	48442	47712	46994	46288	45593	44909	44236	43573	42920

Table VI—Ternary Proportional Logarithms—(Contd)

	67°	68°	69°	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	81°
0°	42920	42276	41642	41017	40401	39794	39195	38604	38021	37446	36878	36318	35765	35218	34679
1	42909	42266	41632	41007	40391	39784	39185	38594	38011	37436	36869	36309	35755	35209	34670
2	42898	42255	41621	40997	40381	39774	39175	38585	38002	37427	36859	36299	35746	35200	34661
3	42887	42244	41611	40986	40371	39764	39165	38575	37992	37417	36850	36290	35737	35191	34652
4	42877	42234	41600	40976	40361	39754	39155	38565	37983	37408	36841	36281	35728	35182	34643
5	42866	42223	41590	40966	40350	39744	39145	38555	37973	37398	36831	36271	35719	35173	34634
6	42855	42213	41579	40955	40340	39734	39136	38545	37963	37389	36822	36262	35710	35164	34625
7	42844	42202	41569	40945	40330	39724	39126	38536	37954	37379	36812	36253	35700	35155	34616
8	42833	42191	41559	40935	40320	39714	39116	38526	37944	37370	36803	36244	35691	35146	34607
9	42823	42181	41548	40924	40310	39704	39106	38516	37934	37360	36794	36234	35682	35137	34598
10	42812	42170	41538	40914	40300	39694	39096	38506	37925	37351	36784	36225	35673	35128	34589
11	42801	42159	41527	40904	40289	39684	39086	38497	37915	37341	36775	36216	35664	35119	34581
12	42790	42149	41517	40894	40279	39674	39076	38487	37905	37332	36766	36207	35655	35110	34572
13	42780	42138	41506	40883	40269	39664	39066	38477	37896	37322	36756	36197	35646	35101	34563
14	42769	42128	41496	40873	40259	39653	39056	38467	37886	37313	36747	36188	35637	35092	34554
15	42758	42117	41485	40863	40249	39643	39046	38458	37877	37303	36737	36179	35628	35083	34545
16	42747	42106	41475	40852	40239	39633	39037	38448	37867	37294	36728	36170	35618	35074	34536
17	42737	42096	41464	40842	40228	39623	39027	38438	37857	37284	36719	36160	35609	35065	34527
18	42726	42085	41454	40832	40218	39613	39017	38428	37848	37275	36709	36151	35600	35056	34518
19	42715	42075	41443	40821	40208	39603	39007	38419	37838	37265	36700	36142	35591	35047	34509
20	42704	42064	41433	40811	40198	39593	38997	38409	37829	37256	36691	36133	35582	35038	34500
21	42693	42053	41423	40801	40188	39583	38987	38399	37819	37246	36681	36123	35573	35029	34491
22	42683	42043	41412	40791	40178	39573	38977	38389	37809	37237	36672	36114	35564	35020	34483
23	42672	42032	41402	40780	40168	39563	38968	38380	37800	37227	36663	36105	35555	35011	34474
24	42661	42022	41391	40770	40157	39553	38958	38370	37790	37218	36653	36095	35545	35002	34465
25	42651	42011	41381	40760	40147	39543	38948	38360	37781	37208	36644	36086	35536	34993	34456
26	42640	42000	41370	40749	40137	39533	38938	38351	37771	37199	36634	36077	35527	34984	34447
27	42629	41990	41360	40739	40127	39523	38928	38341	37761	37189	36625	36068	35518	34975	34438
28	42618	41979	41350	40729	40117	39513	38918	38331	37752	37180	36616	36059	35509	34966	34429
29	42608	41969	41339	40719	40107	39503	38908	38321	37742	37171	36606	36050	35500	34957	34421
30	42597	41958	41329	40708	40097	39493	38899	38312	37733	37161	36597	36040	35491	34948	34411
31	42586	41948	41318	40699	40087	39483	38889	38302	37723	37152	36588	36031	35481	34939	34403
32	42575	41937	41308	40688	40076	39473	38879	38292	37713	37142	36578	36022	35472	34930	34394
33	42565	41927	41298	40678	40066	39464	38869	38282	37704	37133	36569	36013	35463	34921	34385
34	42554	41916	41287	40667	40056	39454	38859	38273	37694	37123	36560	36003	35453	34912	34376
35	42543	41905	41277	40657	40046	39444	38849	38263	37685	37114	36550	35994	35444	34903	34367
36	42533	41895	41266	40647	40036	39434	38839	38253	37675	37104	36541	35985	35436	34894	34358
37	42522	41884	41256	40637	40026	39424	38830	38244	37666	37095	36532	35976	35427	34885	34349
38	42511	41874	41246	40626	40016	39414	38820	38234	37656	37085	36522	35967	35418	34876	34340
39	42500	41863	41235	40616	40006	39404	38810	38224	37646	37076	36513	35957	35409	34867	34332
40	42490	41853	41225	40606	39996	39394	38800	38215	37637	37067	36504	35948	35400	34858	34323
41	42479	41842	41214	40596	39985	39384	38790	38205	37627	37057	36494	35939	35391	34849	34314
42	42468	41832	41204	40585	39975	39374	38781	38195	37618	37048	36485	35930	35381	34840	34305
43	42458	41821	41194	40575	39965	39364	38771	38186	37608	37038	36476	35921	35372	34831	34296
44	42447	41811	41183	40565	39955	39354	38761	38176	37599	37029	36467	35911	35363	34822	34287
45	42436	41800	41173	40555	39945	39344	38751	38166	37589	37019	36457	35902	35354	34813	34278
46	42426	41789	41162	40544	39935	39334	38741	38156	37579	37010	36448	35893	35345	34804	34270
47	42415	41779	41152	40534	39925	39324	38731	38147	37570	37001	36439	35884	35336	34795	34261
48	42404	41768	41142	40524	39915	39314	38722	38137	37560	36991	36429	35875	35327	34786	34252
49	42394	41758	41131	40514	39905	39304	38712	38127	37551	36982	36420	35865	35318	34777	34243
50	42383	41747	41121	40503	39895	39294	38702	38118	37541	36972	36411	35856	35309	34768	34234
51	42372	41737	41111	40493	39885	39284	38692	38108	37532	36963	36401	35847	35300	34759	34225
52	42362	41726	41100	40483	39874	39274	38682	38098	37522	36953	36392	35838	35291	34750	34217
53	42351	41716	41090	40473	39864	39264	38673	38089	37513	36944	36383	35829	35282	34741	34208
54	42340	41705	41080	40463	39854	39254	38663	38079	37503	36935	36374	35820	35273	34732	34199
55	42330	41695	41069	40452	39844	39244	38653	38069	37494	36925	36364	35810	35264	34723	34190
56	42319	41684	41059	40442	39834	39235	38643	38060	37484	36916	36355	35801	35254	34715	34181
57	42308	41674	41048	40432	39824	39225	38633	38050	37474	36906	36346	35792	35245	34706	34172
58	42298	41663	41038	40422	39814	39215	38624	38040	37465	36897	36336	35783	35236	34697	34164
59	42287	41653	41028	40412	39804	39205	38614	38031	37455	36888	36327	35774	35227	34688	34155
60	42276	41642	41017	40401	39794	39195	38604	38020							

Table VI—Ternary Proportional Logarithms—(Contd.)

	82°	83°	84°	85°	86°	87°	88°	89°	90°	91°	92°	93°	94°	95°
0'	34146	33619	33099	32585	32077	31575	31079	30588	30103	29623	29148	28679	28214	27755
1	34137	33611	33091	32577	32069	31567	31071	30580	30095	29615	29141	28671	28207	27747
2	34128	33602	33082	32568	32061	31559	31063	30572	30087	29607	29133	28663	28199	27740
3	34119	33593	33073	32560	32052	31550	31054	30564	30079	29599	29125	28656	28191	27732
4	34111	33585	33065	32551	32044	31542	31046	30556	30071	29591	29117	28648	28184	27724
5	34102	33576	33056	32543	32035	31534	31038	30548	30063	29583	29109	28640	28176	27717
6	34093	33567	33048	32534	32027	31525	31030	30539	30055	29575	29101	28632	28168	27709
7	34084	33558	33039	32526	32019	31517	31021	30531	30047	29567	29093	28625	28161	27702
8	34075	33550	33030	32517	32010	31509	31013	30523	30039	29560	29086	28617	28153	27694
9	34066	33541	33022	32509	32002	31501	31005	30515	30031	29552	29078	28609	28145	27686
10	34058	33532	33013	32500	31993	31492	30997	30507	30023	29544	29070	28601	28138	27679
11	34049	33524	33005	32492	31985	31484	30989	30499	30015	29536	29062	28593	28130	27671
12	34040	33515	32996	32483	31977	31476	30980	30491	30007	29528	29054	28586	28122	27664
13	34031	33506	32987	32475	31968	31467	30972	30483	29999	29520	29046	28578	28114	27656
14	34022	33498	32979	32466	31960	31459	30964	30475	29991	29512	29038	28570	28107	27648
15	34014	33489	32970	32458	31951	31451	30956	30466	29983	29504	29031	28562	28099	27641
16	34005	33480	32962	32449	31943	31442	30948	30458	29975	29496	29023	28555	28091	27633
17	33996	33471	32953	32441	31935	31434	30939	30450	29967	29488	29015	28547	28084	27626
18	33987	33463	32944	32432	31926	31426	30931	30442	29958	29480	29007	28539	28076	27618
19	33978	33454	32936	32424	31918	31418	30923	30434	29950	29472	28999	28531	28068	27610
20	33970	33445	32927	32415	31909	31409	30915	30426	29942	29464	28991	28524	28061	27603
21	33961	33437	32919	32407	31901	31401	30907	30418	29934	29456	28984	28516	28053	27595
22	33952	33428	32910	32398	31893	31393	30898	30410	29926	29448	28976	28508	28045	27588
23	33943	33419	32902	32390	31884	31384	30890	30402	29918	29441	28968	28500	28038	27580
24	33935	33411	32893	32381	31876	31376	30882	30393	29910	29433	28960	28493	28030	27572
25	33926	33402	32884	32373	31867	31368	30874	30385	29902	29425	28952	28485	28022	27565
26	33917	33393	32876	32365	31859	31360	30866	30377	29894	29417	28944	28477	28015	27557
27	33908	33385	32867	32356	31851	31351	30857	30369	29886	29409	28937	28469	28007	27550
28	33899	33376	32859	32348	31842	31343	30849	30361	29878	29401	28929	28462	27999	27542
29	33891	33367	32850	32339	31834	31335	30841	30353	29870	29393	28921	28454	27992	27534
30	33882	33359	32842	32331	31826	31326	30833	30345	29862	29385	28913	28446	27984	27527
31	33873	33350	32833	32322	31817	31318	30825	30337	29854	29377	28905	28438	27976	27519
32	33864	33341	32824	32314	31809	31310	30817	30329	29846	29369	28897	28431	27969	27512
33	33856	33333	32816	32305	31801	31302	30808	30321	29838	29361	28890	28423	27961	27504
34	33847	33324	32807	32297	31792	31293	30800	30313	29830	29354	28882	28415	27953	27497
35	33838	33315	32799	32288	31784	31285	30792	30305	29822	29346	28874	28407	27946	27489
36	33829	33307	32790	32280	31775	31277	30784	30296	29814	29338	28866	28400	27938	27481
37	33820	33298	32782	32271	31767	31269	30776	30288	29806	29330	28858	28392	27930	27474
38	33812	33289	32773	32263	31759	31260	30768	30280	29798	29322	28851	28384	27923	27466
39	33803	33281	32765	32255	31750	31252	30759	30272	29790	29314	28843	28376	27915	27459
40	33794	33272	32756	32246	31742	31244	30751	30264	29782	29306	28835	28368	27908	27451
41	33785	33263	32747	32238	31734	31236	30743	30256	29775	29298	28827	28361	27900	27444
42	33777	33255	32739	32229	31725	31227	30735	30248	29767	29290	28819	28353	27892	27436
43	33768	33246	32730	32221	31717	31219	30727	30240	29759	29282	28811	28346	27885	27429
44	33759	33237	32722	32212	31709	31211	30719	30232	29751	29275	28804	28338	27877	27421
45	33750	33229	32713	32204	31700	31203	30710	30224	29743	29267	28796	28330	27869	27413
46	33742	33220	32705	32195	31692	31194	30702	30216	29735	29259	28788	28322	27862	27406
47	33733	33211	32696	32187	31684	31186	30694	30208	29727	29251	28780	28315	27854	27398
48	33724	33203	32688	32179	31675	31178	30686	30200	29719	29243	28772	28307	27846	27391
49	33715	33194	32679	32170	31667	31170	30678	30192	29711	29235	28765	28300	27839	27383
50	33707	33186	32671	32162	31659	31161	30670	30183	29703	29227	28757	28292	27831	27376
51	33698	33177	32662	32153	31650	31153	30662	30175	29695	29219	28749	28284	27824	27368
52	33689	33168	32654	32145	31642	31145	30653	30167	29687	29211	28741	28276	27816	27360
53	33681	33160	32645	32136	31634	31137	30645	30159	29679	29204	28733	28268	27808	27353
54	33672	33151	32636	32128	31625	31128	30637	30151	29671	29196	28726	28261	27801	27345
55	33663	33142	32628	32120	31617	31120	30629	30143	29663	29188	28718	28253	27793	27338
56	33654	33134	32619	32111	31609	31112	30621	30135	29655	29180	28710	28245	27785	27330
57	33646	33125	32611	32103	31600	31104	30613	30127	29647	29172	28702	28237	27777	27322
58	33637	33117	32602	32094	31592	31095	30605	30119	29639	29164	28694	28229	27770	27315
59	33628	33108	32594	32086	31584	31087	30596	30111	29631	29156	28686	28221	27763	27308
60	33619	33099	32585	32077	31575	31079	30588	30103	29623	29148	28679	28214	27755	27300

Table VI—Ternary Proportional Logarithms—(Contd.)

	96°	97°	98°	99°	100°	101°	102°	103°	104°	105°	106°	107°	108°	109°
0	27300	26850	26405	25964	25527	25093	24667	24244	23824	23408	22997	22589	22185	21785
1	27293	26843	26397	25956	25520	25088	24660	24237	23817	23401	22990	22582	22178	21778
2	27285	26835	26389	25948	25513	25081	24653	24230	23810	23395	22983	22575	22171	21771
3	27278	26828	26382	25941	25506	25074	24646	24222	23803	23388	22976	22569	22165	21765
4	27270	26820	26375	25934	25498	25066	24639	24215	23796	23381	22969	22562	22158	21758
5	27262	26813	26368	25927	25491	25059	24632	24208	23789	23374	22963	22556	22151	21751
6	27255	26805	26360	25920	25484	25052	24625	24201	23782	23367	22956	22548	22145	21745
7	27247	26798	26353	25913	25477	25045	24618	24194	23775	23360	22949	22542	22138	21738
8	27240	26790	26345	25905	25469	25038	24610	24187	23768	23353	22942	22535	22131	21732
9	27232	26783	26338	25898	25462	25031	24603	24180	23761	23346	22935	22528	22125	21725
10	27225	26776	26331	25891	25455	25024	24596	24173	23754	23339	22928	22521	22118	21718
11	27217	26768	26323	25883	25448	25016	24589	24166	23747	23333	22922	22515	22111	21712
12	27210	26761	26316	25876	25440	25009	24582	24159	23740	23326	22915	22508	22105	21705
13	27202	26753	26309	25869	25433	25002	24575	24152	23734	23321	22910	22503	22100	21698
14	27195	26746	26301	25861	25426	24995	24568	24145	23727	23312	22901	22494	22091	21692
15	27187	26738	26294	25854	25419	24988	24561	24138	23720	23305	22894	22488	22084	21685
16	27180	26731	26287	25847	25412	24981	24554	24131	23713	23298	22888	22481	22078	21678
17	27172	26723	26279	25840	25404	24973	24547	24124	23706	23291	22881	22474	22071	21672
18	27165	26716	26272	25832	25397	24966	24540	24117	23699	23284	22874	22467	22064	21665
19	27157	26709	26265	25825	25390	24959	24533	24110	23692	23278	22867	22461	22058	21659
20	27150	26701	26257	25818	25383	24952	24526	24103	23685	23271	22860	22454	22051	21652
21	27142	26694	26250	25810	25376	24945	24518	24096	23678	23264	22854	22447	22044	21645
22	27135	26686	26242	25803	25368	24938	24511	24089	23671	23257	22847	22440	22038	21639
23	27127	26679	26235	25796	25361	24931	24504	24082	23664	23250	22840	22434	22031	21632
24	27120	26671	26228	25789	25354	24923	24497	24075	23657	23243	22833	22427	22024	21626
25	27112	26664	26220	25781	25347	24916	24490	24068	23650	23236	22826	22420	22018	21619
26	27105	26656	26213	25774	25339	24909	24483	24061	23643	23229	22819	22413	22011	21612
27	27097	26649	26206	25767	25332	24902	24476	24054	23636	23223	22813	22407	22004	21606
28	27090	26642	26198	25759	25325	24895	24469	24047	23629	23216	22806	22400	21998	21599
29	27082	26634	26191	25752	25318	24888	24462	24040	23623	23209	22799	22393	21991	21592
30	27075	26627	26184	25745	25311	24881	24455	24033	23616	23202	22792	22386	21984	21586
31	27067	26619	26176	25738	25303	24874	24448	24026	23609	23195	22785	22380	21978	21579
32	27060	26612	26169	25730	25296	24866	24441	24019	23602	23188	22779	22373	21971	21573
33	27052	26605	26162	25723	25289	24859	24434	24012	23595	23181	22772	22366	21964	21566
34	27045	26597	26154	25716	25282	24852	24427	24005	23588	23175	22765	22359	21958	21559
35	27037	26590	26147	25709	25275	24845	24420	23998	23581	23168	22758	22353	21951	21553
36	27030	26582	26140	25701	25267	24838	24413	23991	23574	23161	22752	22346	21944	21546
37	27022	26575	26132	25694	25260	24831	24405	23984	23567	23154	22745	22339	21938	21540
38	27015	26567	26125	25687	25253	24824	24398	23977	23560	23147	22738	22333	21931	21533
39	27007	26560	26118	25680	25246	24817	24391	23970	23553	23140	22731	22326	21924	21526
40	27000	26553	26110	25672	25239	24809	24384	23963	23546	23133	22724	22319	21918	21520
41	26992	26545	26103	25665	25231	24802	24377	23956	23539	23127	22718	22312	21911	21513
42	26985	26538	26096	25658	25224	24793	24368	23947	23530	23118	22710	22304	21904	21507
43	26977	26530	26088	25650	25217	24785	24360	23939	23522	23110	22702	22296	21896	21500
44	26970	26523	26081	25643	25210	24778	24353	23932	23515	23102	22697	22292	21892	21495
45	26962	26516	26074	25636	25203	24771	24346	23925	23508	23096	22690	22286	21884	21487
46	26955	26508	26066	25629	25196	24764	24339	23918	23501	23089	22684	22279	21878	21480
47	26947	26501	26059	25621	25188	24760	24335	23914	23498	23086	22681	22277	21876	21478
48	26940	26493	26052	25614	25181	24752	24328	23908	23491	23079	22674	22269	21868	21470
49	26932	26486	26045	25607	25174	24745	24321	23901	23484	23072	22667	22263	21862	21462
50	26925	26479	26037	25600	25167	24738	24314	23894	23477	23065	22660	22256	21855	21454
51	26917	26471	26030	25592	25160	24731	24307	23887	23470	23058	22653	22249	21848	21447
52	26910	26464	26022	25585	25152	24724	24300	23880	23463	23051	22646	22242	21841	21441
53	26902	26456	26015	25578	25145	24717	24293	23873	23457	23044	22639	22235	21834	21434
54	26895	26449	26008	25571	25138	24710	24286	23866	23450	23038	22633	22229	21828	21427
55	26887	26442	26000	25563	25131	24703	24279	23859	23443	23031	22626	22222	21821	21421
56	26880	26434	25993	25556	25124	24696	24272	23852	23436	23024	22619	22215	21814	21414
57	26872	26427	25986	25549	25117	24689	24265	23845	23429	23017	22612	22208	21807	21408
58	26865	26419	25978	25542	25110	24681	24258	23838	23422	23010	22605	22201	21800	21401
59	26858	26412	25971	25534	25102	24673	24251	23831	23415	23004	22600	22196	21795	21395
60	26850	26405	25964	25527	25095	24667	24244	23824	23408	22997	22589	22185	21785	21388

Table VI—Ternary Proportional Logarithms—(Contd.)

	110°	111°	112°	113°	114°	115°	116°	117°	118°	119°	120°	121°	122°	123°
0	21388	20993	20603	20219	19837	19457	19081	18709	18339	17973	17609	17249	16891	16537
1	21381	20988	20599	20213	19830	19451	19075	18702	18333	17964	17603	17243	16885	16531
2	21375	20982	20593	20207	19821	19445	19069	18696	18327	17960	17597	17237	16879	16525
3	21368	20975	20586	20200	19818	19439	19063	18690	18321	17954	17591	17231	16873	16519
4	21362	20969	20580	20194	19811	19432	19056	18684	18315	17948	17585	17225	16868	16513
5	21355	20962	20573	20187	19805	19426	19050	18678	18309	17942	17579	17219	16862	16507
6	21349	20956	20567	20181	19799	19420	19044	18672	18302	17936	17573	17213	16856	16501
7	21342	20949	20560	20175	19792	19413	19038	18665	18296	17930	17567	17207	16850	16496
8	21335	20943	20554	20168	19786	19407	19032	18659	18290	17924	17561	17201	16844	16490
9	21329	20936	20547	20162	19780	19401	19025	18653	18284	17918	17555	17195	16838	16484
10	21322	20930	20541	20155	19773	19395	19019	18647	18278	17912	17549	17189	16832	16478
11	21316	20923	20534	20149	19767	19388	19013	18641	18272	17906	17543	17183	16826	16472
12	21309	20917	20528	20143	19761	19382	19007	18634	18266	17900	17537	17177	16820	16466
13	21303	20910	20522	20136	19754	19376	19000	18628	18259	17894	17531	17171	16814	16460
14	21296	20904	20515	20130	19748	19369	18994	18622	18253	17887	17525	17165	16808	16454
15	21289	20897	20509	20123	19742	19363	18988	18616	18247	17881	17519	17159	16802	16449
16	21283	20891	20502	20117	19735	19357	18982	18610	18241	17875	17513	17153	16796	16443
17	21276	20884	20496	20111	19729	19351	18976	18604	18235	17869	17507	17147	16791	16437
18	21270	20878	20489	20104	19723	19344	18969	18597	18229	17863	17501	17141	16785	16431
19	21263	20871	20483	20098	19716	19338	18963	18591	18223	17857	17495	17135	16779	16425
20	21257	20865	20476	20091	19710	19332	18957	18585	18217	17851	17489	17129	16773	16419
21	21250	20858	20470	20085	19704	19325	18951	18579	18210	17845	17483	17123	16767	16413
22	21243	20852	20464	20079	19697	19319	18944	18573	18204	17839	17477	17117	16761	16407
23	21237	20845	20457	20072	19691	19313	18938	18567	18198	17833	17471	17111	16755	16402
24	21230	20839	20451	20066	19685	19307	18932	18560	18192	17827	17465	17105	16749	16396
25	21224	20832	20444	20060	19678	19300	18926	18554	18186	17821	17459	17099	16743	16390
26	21217	20826	20438	20053	19672	19294	18920	18548	18180	17815	17453	17093	16737	16384
27	21211	20819	20431	20047	19666	19288	18913	18542	18174	17809	17447	17087	16731	16378
28	21204	20813	20425	20040	19659	19282	18907	18536	18168	17803	17441	17082	16725	16372
29	21198	20806	20418	20034	19653	19275	18901	18530	18162	17797	17435	17076	16720	16366
30	21191	20800	20412	20028	19647	19269	18895	18523	18155	17790	17429	17070	16714	16361
31	21184	20793	20406	20021	19640	19263	18888	18517	18149	17784	17423	17064	16708	16355
32	21178	20787	20399	20015	19634	19257	18882	18511	18143	17778	17417	17058	16702	16349
33	21171	20780	20393	20009	19628	19250	18876	18505	18137	17772	17411	17052	16696	16343
34	21165	20771	20386	20002	19621	19244	18870	18499	18131	17766	17405	17046	16690	16337
35	21158	20767	20380	19996	19615	19238	18864	18493	18125	17760	17399	17040	16684	16331
36	21152	20761	20373	19989	19609	19231	18857	18487	18119	17754	17393	17034	16678	16325
37	21145	20754	20367	19983	19602	19225	18851	18480	18113	17748	17387	17028	16672	16320
38	21139	20748	20361	19977	19596	19219	18845	18474	18107	17742	17381	17022	16666	16314
39	21132	20741	20354	19970	19590	19213	18839	18468	18100	17736	17375	17016	16660	16308
40	21126	20735	20348	19964	19584	19206	18833	18462	18094	17730	17369	17010	16655	16302
41	21119	20728	20341	19958	19577	19200	18826	18456	18088	17724	17363	17004	16649	16296
42	21112	20722	20335	19951	19571	19194	18820	18450	18082	17718	17357	16998	16643	16290
43	21106	20715	20328	19945	19565	19188	18814	18443	18076	17712	17351	16992	16637	16284
44	21099	20709	20322	19938	19558	19181	18808	18437	18070	17706	17345	16986	16631	16279
45	21093	20702	20316	19932	19552	19175	18802	18431	18064	17700	17339	16980	16625	16273
46	21086	20695	20309	19926	19546	19169	18795	18425	18058	17694	17333	16974	16619	16267
47	21080	20690	20303	19919	19539	19163	18789	18419	18052	17688	17327	16968	16613	16261
48	21073	20683	20296	19913	19533	19156	18783	18413	18046	17682	17321	16963	16607	16255
49	21067	20677	20290	19907	19527	19150	18777	18407	18040	17676	17315	16957	16602	16249
50	21060	20670	20284	19900	19520	19144	18771	18400	18033	17669	17309	16951	16596	16243
51	21054	20664	20277	19894	19514	19138	18764	18394	18027	17663	17303	16945	16590	16238
52	21047	20657	20271	19888	19508	19131	18758	18388	18021	17657	17297	16939	16584	16232
53	21041	20651	20265	19881	19502	19125	18752	18382	18015	17651	17291	16933	16578	16226
54	21034	20644	20258	19875	19495	19119	18746	18376	18009	17645	17285	16927	16572	16220
55	21028	20638	20251	19869	19489	19113	18740	18370	18003	17639	17279	16921	16566	16214
56	21021	20631	20245	19862	19483	19106	18733	18364	17997	17633	17273	16915	16560	16208
57	21015	20625	20239	19856	19476	19100	18727	18357	17991	17627	17267	16909	16554	16203
58	21008	20618	20232	19849	19470	19094	18721	18351	17985	17621	17261	16903	16549	16197
59	21001	20612	20226	19843	19464	19088	18715	18345	17979	17615	17255	16897	16543	16191
60	20995	20605	20219	19837	19457	19081	18709	18339	17973	17609	17249	16891	16537	16185

Table VI—Ternary Proportional Logarithms—(Contd.)

	124°	125°	126°	127°	128°	129°	130°	131°	132°	133°	134°	135°	136°	137°
0°	16155	15536	15400	15147	14806	14468	14133	13800	13470	13142	12817	12494	12173	11855
1	16179	15530	15484	15141	14801	14463	14127	13795	13461	13137	12811	12489	12169	11850
2	16173	15525	15479	15135	14795	14457	14122	13790	13455	13131	12806	12483	12163	11845
3	16168	15519	15473	15130	14789	14451	14116	13784	13453	13126	12801	12478	12157	11839
4	16162	15513	15467	15124	14784	14446	14111	13778	13448	13120	12795	12472	12152	11834
5	16156	15507	15461	15119	14779	14440	14105	13773	13442	13115	12790	12467	12147	11829
6	16150	15502	15456	15113	14772	14435	14100	13767	13437	13109	12784	12462	12141	11824
7	16144	15496	15450	15107	14767	14429	14094	13761	13431	13104	12779	12456	12136	11818
8	16138	15490	15444	15101	14761	14423	14088	13756	13426	13099	12774	12451	12131	11813
9	16133	15484	15438	15096	14755	14418	14083	13750	13421	13093	12768	12446	12125	11808
10	16127	15478	15432	15090	14750	14412	14077	13745	13415	13088	12763	12440	12120	11802
11	16121	15473	15427	15084	14744	14407	14072	13739	13410	13082	12757	12435	12115	11797
12	16115	15467	15421	15079	14738	14401	14066	13734	13404	13077	12752	12430	12110	11792
13	16109	15461	15416	15073	14733	14395	14061	13728	13399	13071	12747	12424	12104	11787
14	16103	15455	15410	15067	14727	14390	14055	13723	13393	13066	12741	12419	12099	11781
15	16097	15449	15404	15061	14722	14384	14049	13717	13388	13061	12736	12414	12094	11776
16	16092	15444	15398	15056	14716	14379	14044	13712	13382	13055	12730	12408	12088	11771
17	16086	15438	15393	15050	14710	14373	14038	13706	13377	13050	12725	12403	12083	11765
18	16080	15432	15387	15044	14705	14367	14033	13701	13371	13044	12720	12397	12078	11760
19	16074	15426	15381	15039	14699	14362	14027	13695	13366	13039	12714	12392	12072	11755
20	16068	15421	15375	15033	14693	14356	14022	13690	13360	13033	12709	12387	12067	11750
21	16063	15415	15370	15027	14688	14351	14016	13684	13355	13028	12703	12381	12062	11744
22	16057	15409	15364	15022	14682	14345	14011	13679	13349	13023	12698	12376	12056	11739
23	16051	15403	15358	15016	14676	14339	14005	13673	13344	13017	12693	12371	12051	11734
24	16045	15397	15353	15010	14671	14334	14000	13668	13338	13012	12687	12365	12046	11729
25	16039	15392	15347	15005	14665	14328	13994	13662	13333	13006	12682	12360	12041	11723
26	16034	15386	15341	14999	14659	14323	13988	13657	13328	13001	12677	12355	12035	11718
27	16028	15380	15335	14993	14654	14317	13983	13651	13322	12995	12671	12349	12030	11713
28	16022	15374	15330	14988	14648	14311	13977	13646	13317	12990	12666	12344	12025	11708
29	16016	15369	15324	14982	14643	14306	13972	13640	13311	12985	12660	12339	12019	11702
30	16010	15363	15318	14976	14637	14300	13966	13635	13306	12979	12655	12333	12014	11697
31	16005	15357	15312	14971	14631	14295	13961	13629	13300	12974	12650	12328	12009	11692
32	16000	15351	15307	14965	14626	14289	13955	13624	13295	12968	12644	12323	12003	11686
33	15993	15346	15301	14959	14620	14284	13950	13618	13289	12963	12639	12317	11998	11681
34	15987	15340	15295	14954	14614	14278	13944	13613	13284	12957	12634	12312	11993	11676
35	15981	15334	15290	14948	14609	14272	13938	13607	13278	12952	12628	12307	11987	11671
36	15975	15328	15284	14942	14603	14267	13933	13602	13273	12947	12623	12301	11982	11665
37	15970	15323	15278	14937	14598	14261	13927	13596	13267	12941	12617	12296	11977	11660
38	15964	15317	15272	14931	14592	14256	13922	13591	13262	12936	12612	12291	11972	11655
39	15958	15311	15267	14925	14586	14250	13916	13585	13257	12930	12607	12285	11966	11650
40	15952	15305	15261	14919	14581	14244	13911	13580	13251	12925	12601	12280	11961	11644
41	15946	15299	15255	14914	14575	14239	13905	13574	13246	12920	12596	12275	11956	11639
42	15941	15294	15250	14908	14569	14233	13900	13569	13240	12914	12590	12269	11950	11634
43	15935	15288	15244	14902	14564	14228	13894	13563	13235	12909	12585	12264	11945	11629
44	15929	15282	15238	14897	14558	14222	13889	13558	13229	12903	12580	12259	11940	11623
45	15923	15276	15232	14891	14553	14217	13883	13552	13224	12898	12574	12253	11935	11618
46	15917	15271	15227	14886	14547	14211	13878	13547	13218	12892	12569	12248	11929	11613
47	15912	15265	15221	14880	14541	14205	13872	13541	13213	12887	12564	12243	11924	11608
48	15906	15259	15215	14874	14536	14200	13866	13536	13207	12882	12558	12237	11919	11602
49	15900	15253	15210	14869	14530	14194	13861	13530	13202	12876	12553	12232	11913	11597
50	15894	15248	15204	14863	14524	14189	13855	13525	13197	12871	12548	12227	11908	11592
51	15888	15242	15198	14857	14519	14183	13850	13519	13191	12865	12542	12221	11903	11587
52	15883	15236	15192	14852	14513	14177	13844	13514	13186	12860	12537	12216	11897	11581
53	15877	15230	15187	14846	14508	14172	13839	13508	13180	12855	12531	12211	11892	11576
54	15871	15225	15181	14840	14502	14166	13833	13503	13175	12849	12526	12205	11887	11571
55	15865	15219	15175	14835	14496	14161	13828	13497	13169	12844	12521	12200	11882	11566
56	15859	15213	15170	14829	14491	14155	13822	13492	13164	12838	12515	12195	11876	11560
57	15854	15207	15164	14823	14485	14150	13817	13486	13158	12833	12510	12189	11871	11555
58	15848	15202	15158	14818	14480	14144	13811	13481	13153	12828	12505	12184	11866	11550
59	15842	15196	15153	14812	14474	14138	13806	13475	13148	12822	12499	12179	11860	11545
60	15838	15190	15147	14806	14468	14133	13800	13470	13142	12817	12494	12173	11855	11539



Table VI—Ternary Proportional Logarithms—(Contd.)

	110°	111°	112°	113°	114°	115°	116°	117°	118°	119°	120°	121°	122°	123°
0	21388	20995	20605	20219	19837	19457	19081	18709	18339	17973	17609	17249	16891	16537
1	21381	20988	20599	20213	19830	19451	19075	18702	18333	17966	17603	17243	16885	16531
2	21375	20982	20593	20207	19824	19445	19069	18696	18327	17960	17597	17237	16879	16525
3	21368	20975	20586	20200	19818	19439	19063	18690	18321	17954	17591	17231	16873	16519
4	21362	20969	20580	20194	19811	19432	19056	18683	18315	17948	17585	17225	16868	16513
5	21355	20962	20573	20187	19805	19426	19050	18678	18308	17942	17579	17219	16862	16507
6	21349	20956	20567	20181	19799	19420	19044	18672	18302	17936	17573	17213	16856	16501
7	21342	20949	20560	20175	19792	19413	19038	18665	18296	17930	17567	17207	16850	16496
8	21335	20943	20551	20168	19786	19407	19032	18659	18290	17924	17561	17201	16844	16490
9	21329	20936	20547	20162	19780	19401	19025	18653	18284	17918	17555	17195	16838	16484
10	21322	20930	20541	20155	19773	19395	19019	18647	18278	17912	17549	17189	16832	16478
11	21316	20923	20534	20149	19767	19388	19013	18641	18272	17906	17543	17183	16826	16472
12	21309	20917	20528	20143	19761	19382	19007	18634	18266	17900	17537	17177	16820	16466
13	21303	20910	20522	20136	19754	19376	19000	18628	18259	17894	17531	17171	16814	16460
14	21296	20904	20515	20130	19748	19369	18994	18622	18253	17887	17525	17165	16808	16454
15	21289	20897	20509	20123	19742	19363	18988	18616	18247	17881	17519	17159	16802	16449
16	21283	20891	20502	20117	19735	19357	18982	18610	18241	17875	17513	17153	16796	16443
17	21276	20884	20496	20111	19729	19351	18976	18604	18235	17869	17507	17147	16791	16437
18	21270	20878	20489	20104	19723	19344	18969	18597	18229	17863	17501	17141	16785	16431
19	21263	20871	20483	20098	19716	19338	18963	18591	18223	17857	17495	17135	16779	16425
20	21257	20865	20476	20091	19710	19332	18957	18585	18217	17851	17489	17129	16773	16419
21	21250	20858	20470	20085	19704	19325	18951	18579	18210	17845	17483	17123	16767	16413
22	21243	20852	20464	20079	19697	19319	18944	18573	18204	17839	17477	17117	16761	16407
23	21237	20845	20457	20072	19691	19313	18938	18567	18198	17833	17471	17111	16755	16402
24	21230	20839	20451	20066	19685	19307	18932	18560	18192	17827	17465	17105	16749	16396
25	21224	20832	20444	20060	19678	19300	18926	18554	18186	17821	17459	17099	16743	16390
26	21217	20826	20438	20053	19672	19294	18920	18548	18180	17815	17453	17093	16737	16384
27	21211	20819	20431	20047	19666	19288	18913	18542	18174	17809	17447	17087	16731	16378
28	21204	20813	20425	20040	19659	19282	18907	18536	18168	17803	17441	17082	16725	16372
29	21198	20806	20418	20034	19653	19275	18901	18530	18162	17797	17435	17076	16720	16366
30	21191	20800	20412	20028	19647	19269	18895	18523	18155	17790	17429	17070	16714	16361
31	21184	20793	20406	20021	19640	19263	18888	18517	18149	17784	17423	17064	16708	16355
32	21178	20787	20399	20015	19634	19257	18882	18511	18143	17778	17417	17058	16702	16349
33	21171	20780	20393	20009	19628	19250	18876	18505	18137	17772	17411	17052	16696	16343
34	21165	20774	20386	20002	19621	19244	18870	18499	18131	17766	17405	17046	16690	16337
35	21158	20767	20380	19996	19615	19238	18864	18493	18125	17760	17399	17040	16684	16331
36	21152	20761	20373	19989	19609	19231	18857	18487	18119	17754	17393	17034	16678	16325
37	21145	20754	20367	19983	19602	19225	18851	18480	18113	17748	17387	17028	16672	16320
38	21139	20748	20361	19977	19596	19219	18845	18474	18107	17742	17381	17022	16666	16314
39	21132	20741	20354	19970	19590	19213	18839	18468	18100	17736	17375	17016	16660	16308
40	21126	20735	20348	19964	19584	19206	18833	18462	18094	17730	17369	17010	16655	16302
41	21119	20728	20341	19958	19577	19200	18826	18456	18088	17724	17363	17004	16649	16296
42	21112	20722	20335	19951	19571	19194	18820	18450	18082	17718	17357	16998	16643	16290
43	21106	20715	20328	19945	19565	19188	18814	18443	18076	17712	17351	16992	16637	16284
44	21099	20709	20322	19938	19558	19181	18808	18437	18070	17706	17345	16986	16631	16279
45	21093	20702	20316	19932	19552	19175	18802	18431	18064	17700	17339	16980	16625	16273
46	21086	20696	20309	19926	19546	19169	18795	18425	18058	17694	17333	16974	16619	16267
47	21080	20690	20303	19919	19539	19163	18789	18419	18052	17688	17327	16968	16613	16261
48	21073	20683	20296	19913	19533	19156	18783	18413	18046	17682	17321	16963	16607	16255
49	21067	20677	20290	19907	19527	19150	18777	18407	18040	17676	17315	16957	16602	16249
50	21060	20670	20284	19900	19520	19144	18771	18400	18033	17669	17309	16951	16596	16243
51	21054	20664	20277	19894	19514	19138	18764	18394	18027	17663	17303	16945	16590	16238
52	21047	20657	20271	19888	19508	19131	18758	18388	18021	17657	17297	16939	16584	16232
53	21041	20651	20264	19881	19502	19125	18752	18382	18015	17651	17291	16933	16578	16226
54	21034	20644	20258	19875	19495	19119	18746	18376	18009	17645	17285	16927	16572	16220
55	21028	20638	20251	19869	19489	19113	18740	18370	18003	17639	17279	16921	16566	16214
56	21021	20631	20245	19862	19483	19106	18733	18364	17997	17633	17273	16915	16560	16208
57	21015	20625	20239	19856	19476	19100	18727	18357	17991	17627	17267	16909	16554	16203
58	21008	20618	20232	19849	19470	19094	18721	18351	17985	17621	17261	16903	16549	16197
59	21001	20612	20226	19843	19464	19088	18715	18345	17979	17615	17255	16897	16543	16191
60	20995	20605	20219	19837	19457	19081	18709	18339	17973	17609	17249	16891	16537	16185

## TABLES

Table VI—Ternary Proportional Logarithms—(Contd.)

	124°	125°	126°	127°	128°	129°	130°	131°	132°	133°	134°	135°	136°	137°
0	16183	13335	13180	13147	13097	13043	12983	12918	12847	12770	12684	12589	12484	12359
1	16172	13320	13164	13131	13081	13027	12967	12902	12831	12754	12668	12573	12468	12343
2	16163	13305	13149	13116	13066	13012	12952	12887	12816	12739	12653	12558	12453	12328
3	16154	13290	13134	13101	13051	12997	12937	12872	12801	12724	12638	12543	12438	12313
4	16146	13275	13119	13086	13036	12982	12922	12857	12786	12709	12623	12528	12423	12298
5	16138	13260	13104	13071	13021	12967	12907	12842	12771	12694	12608	12513	12408	12283
6	16130	13245	13089	13056	13006	12952	12892	12827	12756	12679	12593	12498	12393	12268
7	16122	13230	13074	13041	12991	12937	12877	12812	12741	12664	12578	12483	12378	12253
8	16114	13215	13059	13026	12976	12922	12862	12797	12726	12649	12563	12468	12363	12238
9	16106	13200	13044	13011	12961	12907	12847	12782	12711	12634	12548	12453	12348	12223
10	16098	13185	13029	12996	12946	12892	12832	12767	12696	12619	12533	12438	12333	12208
11	16090	13170	13014	12981	12931	12877	12817	12752	12681	12604	12518	12423	12318	12193
12	16082	13155	13000	12967	12917	12863	12803	12738	12667	12590	12504	12409	12304	12179
13	16074	13140	12984	12951	12901	12847	12787	12722	12651	12574	12488	12393	12288	12163
14	16066	13125	12970	12937	12887	12833	12773	12708	12637	12560	12474	12379	12274	12149
15	16058	13110	12955	12922	12872	12818	12758	12693	12622	12545	12459	12364	12259	12134
16	16050	13095	12940	12907	12857	12803	12743	12678	12607	12530	12444	12349	12244	12119
17	16042	13080	12925	12892	12842	12788	12728	12663	12592	12515	12429	12334	12229	12104
18	16034	13065	12910	12877	12827	12773	12713	12648	12577	12500	12414	12319	12214	12089
19	16026	13050	12895	12862	12812	12758	12698	12633	12562	12485	12399	12304	12199	12074
20	16018	13035	12880	12847	12797	12743	12683	12618	12547	12470	12384	12289	12184	12059
21	16010	13020	12865	12832	12782	12728	12668	12603	12532	12455	12369	12274	12169	12044
22	16002	13005	12850	12817	12767	12713	12653	12588	12517	12440	12354	12259	12154	12029
23	15994	13000	12835	12802	12752	12698	12638	12573	12502	12425	12339	12244	12139	12014
24	15986	12985	12820	12787	12737	12683	12623	12558	12487	12410	12324	12229	12124	11999
25	15978	12970	12805	12772	12722	12668	12608	12543	12472	12395	12309	12214	12109	11984
26	15970	12955	12790	12757	12707	12653	12593	12528	12457	12380	12294	12199	12094	11969
27	15962	12940	12775	12742	12692	12638	12578	12513	12442	12365	12279	12184	12079	11954
28	15954	12925	12760	12727	12677	12623	12563	12498	12427	12350	12264	12169	12064	11939
29	15946	12910	12745	12712	12662	12608	12548	12483	12412	12335	12249	12154	12049	11924
30	15938	12895	12730	12697	12647	12593	12533	12468	12397	12320	12234	12139	12034	11909
31	15930	12880	12715	12682	12632	12578	12518	12453	12382	12305	12219	12124	12019	11894
32	15922	12865	12700	12667	12617	12563	12503	12438	12367	12290	12204	12109	12004	11879
33	15914	12850	12685	12652	12602	12548	12488	12423	12352	12275	12189	12094	11989	11864
34	15906	12835	12670	12637	12587	12533	12473	12408	12337	12260	12174	12079	11974	11849
35	15898	12820	12655	12622	12572	12518	12458	12393	12322	12245	12159	12064	11959	11834
36	15890	12805	12640	12607	12557	12503	12443	12378	12307	12230	12144	12049	11944	11819
37	15882	12790	12625	12592	12542	12488	12428	12363	12292	12215	12129	12034	11929	11804
38	15874	12775	12610	12577	12527	12473	12413	12348	12277	12200	12114	12019	11914	11789
39	15866	12760	12595	12562	12512	12458	12398	12333	12262	12185	12099	11994	11889	11764
40	15858	12745	12580	12547	12497	12443	12383	12318	12247	12170	12084	11979	11874	11749
41	15850	12730	12565	12532	12482	12428	12368	12303	12232	12155	12069	11964	11859	11734
42	15842	12715	12550	12517	12467	12413	12353	12288	12217	12140	12054	11949	11844	11719
43	15834	12700	12535	12502	12452	12398	12338	12273	12202	12125	12039	11934	11829	11704
44	15826	12685	12520	12487	12437	12383	12323	12258	12187	12110	12024	11919	11814	11689
45	15818	12670	12505	12472	12422	12368	12308	12243	12172	12095	12009	11904	11799	11674
46	15810	12655	12490	12457	12407	12353	12293	12228	12157	12080	12004	11899	11794	11669
47	15802	12640	12475	12442	12392	12338	12278	12213	12142	12065	11979	11874	11769	11644
48	15794	12625	12460	12427	12377	12323	12263	12198	12127	12050	11964	11859	11754	11629
49	15786	12610	12445	12412	12362	12308	12248	12183	12112	12035	11949	11844	11739	11614
50	15778	12595	12430	12397	12347	12293	12233	12168	12097	12020	11934	11829	11724	11599
51	15770	12580	12415	12382	12332	12278	12218	12153	12082	12005	11919	11814	11709	11584
52	15762	12565	12400	12367	12317	12263	12203	12138	12067	11990	11904	11799	11694	11569
53	15754	12550	12385	12352	12302	12248	12188	12123	12052	11975	11889	11784	11679	11554
54	15746	12535	12370	12337	12287	12233	12173	12108	12037	11960	11874	11769	11664	11539
55	15738	12520	12355	12322	12272	12218	12158	12093	12022	11945	11859	11754	11649	11524
56	15730	12505	12340	12307	12257	12203	12143	12078	12007	11930	11844	11739	11634	11509
57	15722	12490	12325	12292	12242	12188	12128	12063	11992	11915	11829	11724	11619	11494
58	15714	12475	12310	12277	12227	12173	12113	12048	11977	11900	11814	11709	11604	11479
59	15706	12460	12295	12262	12212	12158	12098	12033	11962	11885	11799	11694	11589	11464
60	15698	12445	12280	12247	12197	12143	12083	12018	11947	11870	11784	11679	11574	11449

Table VI—Ternary Proportional Logarithms—(Contd.)

	138°	139°	140°	141°	142°	143°	144°	145°	146°	147°	148°	149°	150°	151°
0	11539	11226	10911	10605	10298	09994	09691	09390	09092	08796	08501	08209	07918	07630
1	11534	11221	10909	10604	10299	09995	09692	09391	09093	08797	08502	08210	07919	07625
2	11529	11215	10901	10595	10288	09981	09678	09376	09078	08782	08487	08194	07902	07608
3	11524	11210	10899	10594	10283	09978	09675	09373	09075	08779	08484	08191	07898	07604
4	11518	11205	10894	10589	10278	09973	09670	09368	09070	08774	08479	08186	07893	07599
5	11513	11200	10889	10584	10273	09968	09665	09363	09065	08769	08474	08181	07888	07594
6	11508	11195	10883	10578	10268	09963	09660	09358	09060	08764	08469	08176	07883	07589
7	11503	11189	10878	10573	10263	09958	09655	09353	09055	08759	08464	08171	07878	07584
8	11497	11184	10873	10568	10258	09953	09650	09348	09050	08754	08459	08166	07873	07579
9	11492	11179	10868	10563	10253	09948	09645	09343	09045	08749	08454	08161	07868	07574
10	11487	11174	10863	10558	10247	09943	09640	09338	09040	08744	08449	08156	07863	07569
11	11482	11169	10858	10553	10242	09938	09635	09333	09035	08739	08444	08151	07858	07564
12	11476	11163	10852	10547	10237	09933	09630	09328	09030	08734	08439	08146	07853	07559
13	11471	11158	10847	10542	10232	09928	09625	09323	09025	08729	08434	08141	07848	07554
14	11466	11153	10842	10537	10227	09923	09620	09318	09020	08724	08429	08136	07843	07549
15	11461	11148	10837	10528	10222	09918	09615	09313	09015	08719	08424	08131	07838	07544
16	11456	11143	10832	10523	10217	09913	09610	09308	09010	08714	08419	08126	07833	07539
17	11450	11137	10827	10518	10212	09908	09605	09303	09005	08709	08414	08121	07828	07534
18	11445	11132	10821	10513	10207	09903	09600	09301	09003	08707	08412	08119	07826	07532
19	11440	11127	10816	10508	10202	09898	09595	09296	08998	08702	08407	08114	07821	07527
20	11435	11122	10811	10503	10197	09893	09590	09291	08993	08697	08402	08109	07816	07522
21	11429	11117	10806	10498	10192	09887	09585	09286	08988	08692	08397	08104	07811	07517
22	11424	11111	10801	10493	10186	09882	09580	09281	08983	08687	08392	08099	07806	07512
23	11419	11106	10796	10487	10181	09877	09575	09276	08978	08682	08387	08094	07801	07507
24	11414	11101	10791	10482	10176	09872	09570	09271	08973	08677	08382	08089	07796	07502
25	11408	11096	10785	10477	10171	09867	09565	09266	08968	08673	08378	08085	07792	07500
26	11403	11091	10780	10472	10166	09862	09560	09261	08963	08668	08373	08080	07787	07493
27	11398	11085	10775	10467	10161	09857	09555	09256	08958	08663	08368	08075	07782	07488
28	11393	11080	10770	10462	10156	09852	09550	09251	08953	08658	08363	08070	07777	07483
29	11387	11075	10765	10457	10151	09847	09545	09246	08948	08653	08358	08065	07772	07478
30	11382	11070	10760	10452	10146	09842	09540	09241	08943	08648	08353	08060	07767	07473
31	11377	11065	10754	10446	10141	09837	09535	09236	08938	08643	08348	08055	07762	07468
32	11372	11059	10749	10441	10136	09832	09530	09231	08933	08638	08343	08050	07757	07463
33	11367	11054	10744	10436	10131	09827	09525	09226	08928	08633	08338	08045	07752	07458
34	11361	11049	10739	10431	10126	09822	09520	09221	08923	08628	08333	08040	07747	07453
35	11356	11044	10734	10426	10120	09817	09515	09216	08918	08623	08328	08035	07742	07448
36	11351	11039	10729	10421	10115	09812	09510	09211	08913	08618	08323	08030	07737	07443
37	11346	11034	10724	10416	10110	09807	09505	09206	08908	08613	08318	08025	07732	07438
38	11340	11028	10718	10411	10105	09802	09500	09201	08903	08608	08313	08020	07727	07433
39	11335	11023	10713	10406	10100	09797	09495	09196	08898	08603	08308	08015	07722	07428
40	11330	11018	10708	10400	10095	09792	09490	09191	08893	08598	08303	08010	07717	07423
41	11325	11013	10703	10395	10090	09787	09485	09186	08888	08593	08300	08007	07714	07420
42	11320	11008	10698	10390	10085	09782	09480	09181	08883	08588	08295	08002	07709	07415
43	11314	11002	10693	10385	10080	09777	09475	09176	08878	08583	08290	08000	07711	07417
44	11309	10997	10688	10380	10075	09772	09470	09171	08873	08578	08285	07995	07707	07413
45	11304	10992	10682	10375	10070	09767	09465	09166	08868	08573	08280	07991	07702	07414
46	11299	10987	10677	10370	10065	09761	09460	09161	08863	08568	08275	07986	07697	07410
47	11294	10982	10672	10365	10059	09756	09455	09156	08858	08563	08270	07981	07692	07405
48	11288	10977	10667	10360	10054	09751	09450	09151	08853	08558	08265	07976	07687	07400
49	11283	10971	10662	10355	10049	09746	09445	09146	08848	08553	08260	07971	07682	07395
50	11278	10966	10657	10349	10044	09741	09440	09141	08843	08548	08255	07966	07677	07391
51	11273	10961	10652	10344	10039	09736	09435	09136	08838	08543	08250	07961	07672	07386
52	11267	10956	10646	10339	10034	09731	09430	09131	08833	08538	08245	07956	07667	07381
53	11262	10951	10641	10334	10029	09726	09425	09126	08828	08533	08240	07951	07662	07376
54	11257	10945	10636	10329	10024	09721	09420	09121	08823	08528	08235	07946	07657	07371
55	11252	10940	10631	10324	10019	09716	09415	09116	08818	08523	08230	07941	07652	07367
56	11247	10935	10626	10319	10014	09711	09410	09111	08813	08518	08225	07936	07647	07361
57	11241	10930	10621	10314	10009	09706	09405	09106	08808	08513	08220	07931	07642	07355
58	11236	10925	10616	10309	10004	09701	09400	09101	08803	08508	08215	07926	07637	07351
59	11231	10920	10610	10304	09999	09696	09395	09096	08798	08503	08210	07921	07632	07346
60	11226	10914	10605	10298	09994	09691	09390	09092	08796	08501	08209	07918	07630	07343

Table VI—Ternary Proportional Logarithms—(Contd)

	152°	153°	154°	155°	156°	157°	158°	159°	160°	161°	162°	163°	164°	165°
0	07343	07058	06775	06494	06215	05937	05662	05388	05115	04845	04576	04308	04043	03779
1	07338	07053	06770	06489	06210	05933	05657	05383	05111	04840	04571	04304	04038	03774
2	07333	07049	06766	06485	06206	05928	05652	05378	05106	04836	04567	04300	04034	03770
3	07329	07044	06761	06480	06201	05923	05648	05374	05102	04831	04562	04295	04030	03766
4	07324	07039	06756	06475	06196	05919	05643	05369	05097	04827	04558	04291	04025	03761
5	07319	07034	06752	06471	06192	05914	05639	05365	05093	04822	04553	04286	04021	03757
6	07314	07030	06747	06466	06187	05910	05634	05360	05088	04818	04549	04282	04016	03753
7	07310	07025	06742	06461	06182	05905	05629	05356	05084	04813	04544	04277	04012	03748
8	07305	07020	06738	06457	06178	05900	05625	05351	05079	04809	04540	04273	04008	03744
9	07300	07016	06733	06452	06173	05896	05620	05347	05075	04804	04536	04269	04003	03739
10	07295	07011	06728	06447	06168	05891	05616	05342	05070	04800	04531	04264	03999	03735
11	07291	07006	06724	06443	06164	05887	05611	05337	05066	04795	04527	04260	03994	03731
12	07286	07001	06719	06438	06159	05882	05607	05333	05061	04791	04522	04255	03990	03726
13	07281	06997	06714	06433	06155	05877	05602	05328	05056	04786	04518	04251	03986	03722
14	07276	06992	06709	06429	06150	05873	05597	05324	05052	04782	04513	04246	03981	03717
15	07272	06987	06705	06424	06145	05868	05593	05319	05047	04777	04509	04242	03977	03713
16	07267	06982	06700	06419	06141	05864	05588	05315	05043	04773	04504	04237	03972	03709
17	07262	06978	06695	06415	06136	05859	05584	05310	05038	04768	04500	04233	03968	03704
18	07257	06973	06691	06410	06131	05854	05579	05306	05034	04764	04495	04229	03963	03700
19	07253	06968	06686	06405	06127	05850	05575	05301	05029	04759	04491	04224	03959	03696
20	07248	06964	06681	06401	06122	05845	05570	05297	05025	04755	04486	04220	03955	03691
21	07243	06959	06677	06396	06117	05841	05565	05292	05020	04750	04482	04215	03950	03687
22	07238	06954	06672	06391	06113	05836	05561	05288	05016	04746	04478	04211	03946	03682
23	07234	06949	06667	06387	06108	05831	05556	05283	05011	04741	04473	04206	03941	03678
24	07229	06945	06663	06382	06101	05827	05552	05278	05007	04737	04469	04202	03937	03674
25	07224	06940	06658	06377	06099	05822	05547	05274	05002	04732	04464	04198	03933	03669
26	07219	06935	06653	06373	06094	05818	05543	05269	04998	04728	04460	04193	03928	03665
27	07215	06931	06648	06368	06090	05813	05538	05265	04993	04723	04455	04189	03924	03661
28	07210	06926	06644	06364	06085	05808	05533	05260	04989	04719	04451	04184	03919	03656
29	07205	06921	06639	06359	06080	05804	05529	05256	04984	04714	04446	04180	03915	03652
30	07200	06916	06634	06354	06076	05799	05524	05251	04980	04710	04442	04175	03911	03647
31	07195	06912	06630	06350	06071	05795	05520	05247	04975	04706	04437	04171	03906	03643
32	07191	06907	06625	06345	06067	05790	05515	05242	04971	04701	04433	04167	03902	03639
33	07186	06902	06620	06340	06062	05785	05511	05238	04966	04697	04429	04162	03897	03634
34	07181	06898	06616	06336	06057	05781	05506	05233	04962	04692	04424	04158	03893	03630
35	07177	06893	06611	06331	06053	05776	05501	05228	04957	04688	04420	04153	03889	03626
36	07172	06888	06606	06326	06048	05772	05497	05224	04953	04683	04415	04149	03884	03621
37	07167	06883	06602	06322	06043	05767	05492	05219	04948	04679	04411	04144	03880	03617
38	07162	06879	06597	06317	06039	05762	05488	05215	04944	04674	04406	04140	03875	03612
39	07158	06874	06592	06312	06034	05758	05483	05210	04939	04670	04402	04136	03871	03608
40	07153	06869	06588	06308	06030	05753	05479	05206	04935	04665	04397	04131	03867	03604
41	07148	06865	06583	06303	06025	05749	05474	05201	04930	04661	04393	04127	03862	03599
42	07143	06860	06578	06298	06020	05744	05470	05197	04926	04656	04388	04122	03858	03595
43	07139	06855	06574	06294	06016	05739	05465	05192	04921	04652	04384	04118	03853	03591
44	07134	06850	06569	06289	06011	05735	05460	05188	04917	04647	04380	04114	03849	03586
45	07129	06846	06564	06284	06006	05730	05456	05183	04912	04643	04375	04109	03845	03582
46	07124	06841	06560	06280	06002	05726	05451	05179	04908	04638	04371	04105	03840	03578
47	07120	06836	06555	06275	05997	05721	05447	05174	04903	04634	04366	04100	03836	03573
48	07115	06832	06550	06271	05993	05717	05442	05170	04899	04629	04362	04096	03832	03569
49	07110	06827	06545	06266	05988	05712	05438	05165	04894	04625	04357	04091	03827	03564
50	07105	06822	06541	06261	05983	05707	05433	05161	04890	04620	04353	04087	03823	03560
51	07101	06817	06536	06257	05979	05703	05429	05156	04885	04616	04348	04083	03818	03556
52	07096	06813	06531	06252	05974	05698	05424	05151	04881	04612	04344	04078	03814	03551
53	07091	06808	06527	06247	05970	05694	05419	05147	04876	04607	04340	04074	03810	03547
54	07087	06803	06522	06243	05965	05689	05415	05142	04872	04603	04335	04069	03805	03543
55	07082	06799	06517	06238	05960	05684	05410	05138	04867	04598	04331	04065	03801	03538
56	07077	06794	06513	06233	05956	05680	05406	05133	04863	04594	04326	04061	03796	03534
57	07072	06789	06508	06229	05951	05675	05401	05129	04858	04589	04322	04056	03792	03530
58	07068	06785	06503	06224	05947	05671	05397	05124	04854	04585	04317	04052	03788	03525
59	07063	06780	06499	06219	05942	05666	05392	05120	04849	04580	04313	04047	03783	03521
60	07058	06775	06494	06215	05937	05662	05388	05115	04845	04576	04308	04043	03779	03516

Table VI—Ternary Proportional Logarithms—(Contd.)

	166°	167°	168°	169°	170°	171°	172°	173°	174°	175°	176°	177°	178°	179°
0°	03510	03256	02996	02739	02482	02228	01974	01723	01472	01223	00976	00730	00485	00242
1	03512	03251	02992	02734	02478	02223	01970	01718	01468	01219	00972	00726	00481	00238
2	03503	03247	02988	02730	02474	02219	01966	01714	01464	01215	00968	00722	00477	00234
3	03503	03243	02983	02725	02470	02215	01962	01710	01460	01211	00964	00718	00473	00230
4	03492	03238	02979	02721	02465	02211	01958	01706	01456	01207	00960	00714	00469	00226
5	03495	03234	02975	02717	02461	02206	01953	01702	01452	01203	00955	00709	00465	00222
6	03490	03230	02970	02713	02457	02202	01949	01697	01447	01197	00951	00705	00461	00218
7	03484	03225	02966	02709	02453	02198	01945	01693	01443	01193	00947	00701	00457	00214
8	03482	03221	02962	02704	02449	02194	01941	01689	01439	01189	00943	00697	00453	00210
9	03477	03217	02958	02700	02444	02190	01937	01685	01435	01186	00939	00693	00449	00206
10	03473	03212	02953	02696	02440	02185	01932	01681	01431	01182	00935	00689	00445	00202
11	03469	03208	02949	02692	02436	02181	01928	01677	01427	01178	00931	00685	00441	00197
12	03464	03204	02945	02688	02431	02177	01924	01672	01422	01174	00927	00681	00436	00193
13	03460	03200	02940	02683	02427	02173	01920	01668	01418	01170	00923	00677	00432	00189
14	03455	03195	02936	02679	02423	02168	01916	01664	01414	01166	00918	00673	00428	00185
15	03451	03191	02932	02674	02419	02164	01911	01660	01410	01161	00914	00669	00424	00181
16	03447	03186	02927	02670	02414	02160	01907	01656	01406	01157	00910	00665	00420	00177
17	03442	03182	02923	02666	02410	02156	01903	01652	01402	01153	00906	00660	00416	00173
18	03438	03178	02919	02662	02406	02152	01899	01647	01398	01149	00902	00656	00412	00169
19	03434	03173	02915	02657	02402	02147	01895	01643	01393	01145	00898	00652	00408	00165
20	03429	03169	02910	02653	02397	02143	01890	01639	01389	01141	00894	00648	00404	00161
21	03425	03165	02906	02649	02393	02139	01886	01635	01385	01137	00890	00644	00400	00157
22	03421	03160	02902	02644	02389	02135	01882	01631	01381	01133	00886	00640	00396	00153
23	03416	03156	02897	02640	02385	02130	01878	01627	01377	01128	00881	00636	00392	00149
24	03412	03152	02893	02636	02380	02126	01874	01622	01373	01124	00877	00632	00388	00145
25	03408	03147	02889	02632	02376	02122	01869	01618	01368	01120	00873	00628	00384	00141
26	03403	03143	02884	02627	02372	02118	01865	01614	01364	01116	00869	00624	00380	00137
27	03399	03139	02880	02623	02368	02114	01861	01610	01360	01112	00865	00620	00376	00133
28	03395	03134	02876	02619	02363	02109	01857	01606	01356	01108	00861	00616	00372	00129
29	03390	03130	02872	02615	02359	02105	01853	01601	01352	01104	00857	00611	00367	00125
30	03386	03126	02867	02610	02355	02101	01848	01597	01348	01100	00853	00607	00363	00121
31	03381	03121	02863	02606	02351	02097	01844	01593	01344	01095	00849	00603	00359	00117
32	03377	03117	02859	02602	02346	02092	01840	01589	01339	01091	00845	00599	00355	00113
33	03373	03113	02854	02597	02342	02088	01836	01585	01335	01087	00840	00595	00351	00109
34	03368	03108	02850	02593	02338	02084	01832	01581	01331	01083	00836	00591	00347	00105
35	03364	03104	02846	02589	02334	02080	01827	01576	01327	01079	00832	00587	00343	00101
36	03360	03100	02841	02585	02329	02076	01823	01572	01323	01075	00828	00583	00339	00097
37	03355	03096	02837	02580	02325	02071	01819	01568	01319	01071	00824	00579	00335	00093
38	03351	03091	02833	02576	02321	02067	01815	01564	01315	01067	00820	00575	00331	00089
39	03347	03087	02829	02572	02317	02063	01811	01560	01310	01062	00816	00571	00327	00085
40	03342	03083	02824	02568	02312	02059	01806	01556	01306	01058	00812	00567	00323	00080
41	03338	03078	02820	02563	02308	02054	01802	01551	01302	01054	00808	00563	00319	00076
42	03334	03074	02816	02559	02304	02050	01798	01547	01298	01050	00804	00559	00315	00072
43	03329	03070	02811	02555	02300	02046	01794	01543	01294	01046	00799	00554	00311	00068
44	03325	03065	02807	02551	02295	02042	01790	01539	01290	01042	00795	00550	00307	00064
45	03321	03061	02803	02546	02291	02038	01785	01535	01286	01038	00791	00546	00303	00060
46	03316	03057	02799	02542	02287	02033	01781	01531	01281	01034	00787	00542	00299	00056
47	03312	03052	02794	02538	02283	02029	01777	01526	01277	01029	00783	00538	00295	00052
48	03308	03048	02790	02533	02278	02025	01773	01522	01273	01025	00779	00534	00290	00048
49	03303	03044	02786	02529	02274	02021	01769	01518	01269	01021	00775	00530	00286	00044
50	03299	03039	02781	02525	02270	02017	01764	01514	01265	01017	00771	00526	00282	00040
51	03295	03035	02777	02521	02266	02012	01760	01510	01261	01013	00767	00522	00278	00036
52	03290	03031	02773	02516	02262	02008	01756	01506	01257	01009	00763	00518	00274	00032
53	03286	03026	02769	02512	02257	02004	01752	01501	01252	01005	00759	00514	00270	00028
54	03282	03022	02764	02508	02253	02000	01748	01497	01248	01001	00754	00510	00266	00024
55	03277	03018	02760	02504	02249	01995	01744	01493	01244	00997	00750	00506	00262	00020
56	03273	03014	02756	02499	02245	01991	01739	01489	01240	00992	00746	00502	00258	00016
57	03269	03009	02751	02495	02240	01987	01735	01485	01236	00988	00742	00497	00254	00012
58	03264	03005	02747	02491	02236	01983	01731	01481	01232	00984	00738	00493	00250	00008
59	03260	03001	02743	02487	02232	01979	01727	01476	01228	00980	00734	00489	00246	00004
60	03256	02996	02739	02482	02228	01974	01723	01472	01223	00976	00730	00485	00242	00000

# ERRATA

	FOR	READ
Page 37 Line 11 and 12,	"The definition—admits of	"There are
Page 46	"Exercise 32, 33, 34, 35, 36, 37, 38"	"Exercise 42, 43, 44, 45, 46, 47, 48"
Page 52	"Exercise 39"	"Exercise 49"
Page 53	"Exercise 40, 41	"Exercise 50, 51"
Page 66	"Exercise 42, 43, 44, 45, 46, 47, 48, 49"	"Exercise 52, 53, 54, 55, 56, 57, 58, 59"
Page 72 Insert here	"Exercise 60" (see page 160)	
Page 97	"Article 74"	"Article 75"
Page 98	"Article 75	"Article 76"
Page 99	"Radical"	"Radix
"	"Article 76"	"Article 77"
Page 100	"Article 77, 78	"Article 78, 79
Page 101	"Article 79"	"Article 80"
Page 103	"Article 80"	"Article 81"
Page 108	"Article 81	"Article 82"
Page 109	"Article 82, 83"	"Article 83, 84"
Page 112	"Article 84,	"Article 85"
Page 118 Line 1, Delete	"for the twenty ninth year"	

# INDEX

N B —The figures refer to pages

## A

Admissibility of Converse Directions, 9  
Angles, Can Progressed—be directed to 96, Can Progressed—be directed to 97  
Angular or Aspect Extent (A E), 6  
Answers, 134—160  
Anti clockwise and Clockwise Distances from D B to S P, 12  
Arc of Direction (A D), 17, 40  
Aspect Angle, First—and the Subsequent Ones, 55.  
Aspects and Directions, Comparative Study of—, 129  
Aspects, Epochal—, 100, Mundane—5, —of Direction, 6 —Zodiacal—, 5  
Aspect Extents of Direction, Scale of—, 16

## B

Birth day Map, 104  
Bodies, Mundane Positions of—, 2  
Progressed—, 73 Radical—, 73  
Body, Directed—, 6, 47 Passive—, 47  
Transitting—, 115

## C

Cases, I & II of Primary Mundane Directions, 15;—A, B, C & D of Isolated Primary Mundane Directions, 30, 33,—1, 2, 3 & 4 of both Types 1 and 2 of Mundane Parallels, 43 —(i) and (ii) of Rapt Parallels, 49 to 51  
Classification of Directions, 6  
Clockwise and Anti clockwise Distances from D B to S P, 12  
Combined Mundane Map, 3  
Comparative Study of Aspects and Directions, 129  
Conjunction by Transit, 115  
Contention I—Converse Directions are inadmissible, 10.

Contention II—Directions to the Horizon are needless, 36  
Contention III—Primary Zodiacal Directions are irrational, 69  
Contention IV—Angles cannot be Progressed, 97  
Converse Directions, 7, 54, Admissibility of—, 9  
Correction, of the Arc of Direction for the Annual Motion of the Directed Body, 70, Negative and Positive—, 70  
Current Synodical Lunations, 109  
Determination of all the Aspects at a—, 109  
Cuspal Distance, Backwards, 3 —Forwards, 3

## - D

Date, Progressed—Corresponding to an Ordinal Year of Life, 74 Noon—, 99  
Decreasing and Increasing Series of Aspects of Direction, 15  
Determination of, the A D of a Body directed to a given Aspect, 30,—A D's in a series of Primary Mundane Directions, 20—A D's in the Mundane Parallels of all bodies to different S P's, 46 —all Rapt Parallels, 51,—all the Aspects at a Current Synodical Lunation 109,—all Epochal Aspects on a given date, 101 —Arc of Direction, 81, 88;—Correction for the Annual Motion of a Directed Body, 70,—Mundane Aspect of a given A D, 33,—Transits at a given time, 116  
Dictum I—The Taking of Arcs, 13  
, II—The Rectification of Arcs, 15.  
, III—The Subtraction of Angles, 48

Different Types of Mundane Parallels, 37

Direct Body and Passive Body, 47

Directed Body (D B), 6

Directions, 6, Admissibility of Converse—, 9, Arcs of—, 17, 40, 49, Classification of—, 6, Direct and Converse—, 54, The Five Elements of—, 6, Notation of—, 7, Opposite and Reverse—, 8, Primary—, 11, Primary Mundane—12, Primary Zodiacal—7, 54, Secondary—, 73, Scale of the Aspect Extents of—, 16, —to the Angles, 19,—to Zodiacal Parallel, 60 —Zodiacal Rapt Parallel, 60

Distance, Meridional—of D B, 38.

Diurnal, Map, 113,—Rotation, 96

## E

Epochal Aspects, 100, Determination of all the—on a given date, 101

Exercise (1), 1,—(2) & (3), 2,—(4) to (6), 3,—(7) and (8), 5,—(9) to (18), 29,—(19) to (35), 30,—(36) to (38), 33,—(39) to (41), 36,—(42) to (48), 46,—49, 52,—(50) and (51), 53,—(52) to (59), 66 —(60), 160

## F

Figure I—George V's Birth Zodiacal Map, 2

II—George V's Birth Mundane Map, 5

III—Opposite and Reverse Directions, 9

IV—Clockwise and Anti clockwise Distances, 13

V—Types of Mundane Parallel, 37

VI—Direct Mundane Parallels of Type 1, 40

VII—Converse Mundane Parallels of Type 1, 41

VIII—Direct Mundane Parallels of Type 2, 42

IX—Converse Mundane Parallels of Type 2, 42

X—Direct Rapt Parallels, 50

XI—Converse Rapt Parallels, 50

XII—Direct Primary Zodiacal Directions, 58

XIII—Converse Primary Zodiacal Directions, 58.

XIV—Progressed Map for the 29th Year, 78

XV—Progressed Map for the 45th Year, 78

XVI—Progressed Map for the 46th Year, 78

XVII—Graph of Declinations, 94.

XVIII—Map for June 2, 1893, 105

XIX—Map for June 3, 1909, 106

XX—Map for June 3, 1910, 107

First Anti clockwise M H, 48

First Aspect Extent and the Subsequent Ones, 55

First Clockwise M H, 48

First M.D. of D B, 48

## G

Graph Method, 94

## H

Horizon, Relation between the Primary Mundane Directions to the Meridian and those to the—, 36

Horoscopes, Progressed—, 77.

## I

Increasing and Decreasing Series of Aspects of Direction, 15

## L

Lunar Revolutions or Returns, 112.

Lunation, Synodical—, 100 Current—, 109

## M

Map, Birth day—, 104, Combined Mundane—, 3, Diurnal—, 113, Monthly—, 112, Zodiacal—, 2

Measurement of Time, 8, 71

Meridian, Relation between Primary Mundane Directions to the—and those to the Horizon, 36

Meridional, Distance of D B, 38,—Half of Parallel, 38, 48

Method, Graph—, 94 Planets at Noon —, 98

Moderation of A.D. on D B crossing its Horizon, 17,—the Meridional Distance of the Stationary Position, 39



## M

Moment of Birth, Progressed—, 76  
 Mundane Aspects, 5  
 Mundane Directions, Primary—, 7, 12  
 Mundane Positions of Bodies, 2

## N

Nativity, Standard—, 1.  
 Noon Date, 98  
 Notation of Directions, 7.

## O

Opposite and Reverse Directions, 8  
 Opposition by Transit, 115.

## P

Parallel, Arc of—, 47. Meridional Half  
 of—38, Rapt—, 47  
 "Planets at Noon" Method, 98  
 Point, Transitted—, 115.  
 Position, Stationary—(S P), C.  
 Positions, Mundane—of Bodies, 2.  
 Radical—1. Zodiacal—of Bodies, 1.  
 Zodiacal—of Cusps of Houses, 1.  
 Position of the D.B. at the end of a  
 Direction, 56  
 Primary Directions, 6, 11,—to the  
 Mundane Parallel, 37 and 38  
 Primary Mundane Directions, 12. Rela-  
 tion between—to the Meridian and  
 those to the Horizon, 36  
 Primary Zodiacal Directions, 54,—  
 of the Angles and to the Bodies, 54  
 Are—rational? 66  
 Problem 1 to 4, 27 —5 to 7, 28,—8,  
 29,—9 & 10, 31 11 & 12, 32,—13,  
 33 —14 to 16, 34,—17 & 18, 43,—  
 19, 44 —20, 52 —21, 53 —22, 60,—  
 23, 4, 24, 61,—25, 62, 27, 63,—28, 66,  
 —29, 70 —30, 75,—31, 76,—32, & 33,  
 80,—34, 83,—35, 84 —36, 86, 37,  
 87 —38 & 39, 90 —40, 91 —41, 101  
 —42, 102,—43, 103 —44, 104,—45,  
 105,—46, 106 —47, & 48, 108 —49,  
 109,—50 & 51, 110 —52, 111,—53,  
 112,—54 & 55, 113 —56 to 58, 114  
 —59 & 60, 119 —61, 120 —62, 122  
 —63, 124,—64, 127  
 Progressed Angles, Can—be directed?  
 95, Can—be directed to? 97

## P

Progressed, Bodies, 73.—Date corres-  
 ponding to an Ordinal Year of Life,  
 74.—Horoscopes, 77.—Moment of  
 Birth, 76.—Positions, 73.—Year, 74  
 Progressed Horoscopes, Are—to be cast  
 for Mean time or Apparent time of  
 birth? 95.

## R

Radical, Bodies, 73.—Positions, 1.  
 Radix System, 99.  
 Rapt Parallel 47.  
 Relation between Primary Mundane  
 Directions to the Meridian and those  
 to the Horizon, 36.  
 Reverse and Opposite Directions, 8  
 Revolutions or Returns, Lunar,—112,  
 Solar—, 103, Solar—to the Progressed  
 Sun, 108  
 Rotation, Diurnal, 97.  
 Rules, Exhaustive, Comprehensive and  
 Universal, 8  
 Rule I—Clockwise and Anticlockwise  
 Distances, 14  
 II—Rectification of Distances, 14  
 III—Moderation of Cuspal Dis-  
 tances, 14.  
 IV—Shorter Distance, 15  
 V—First Aspect Extent, 16  
 VI—Scale of Aspect Extents, 16  
 VII—Measurement of Aspect Ex-  
 tents, 17  
 VIII—The First Arc of Direction  
 in Primary Mundane Di-  
 rections, 17  
 IX—Subsequent Arcs of Direc-  
 tions in Primary Mundane  
 Directions, 17  
 X—The Moderation of A.D. on  
 D.B. crossing its Horizon,  
 18  
 XI—Horizontal Distances, 18  
 XII—The Moderation of the Ex-  
 cess of A.D. on D.B. cross-  
 ing its horizon, 19  
 XIII—Moderation of A.D. when  
 D.B. crosses its horizon, 19  
 XIV—A.D.'s in isolated cases of  
 Primary Mundane Direc-  
 tion, 31.

R

- XV—A.E.'s in isolated cases, 33.
- XVI—The equivalent directions to the two angles, 36.
- XVII—Types 1 and 2 of Mundane Parallels, 38.
- XVIII—Meridional Half of Parallel in Mundane Parallels, 38.
- XIX—The M.D.'s of D.B. in Mundane Parallels, 39.
- XX—The S.A. to be moderated in Mundane Parallels, 39.
- XXI—Moderation of the birth M.D. of S.P., 40.
- XXII—A.D.'s in Mundane Parallels of both Types 1 and 2, 43.
- XXIII—Arcs of Parallel in Rapt Parallels, 48.
- XXIV—Meridional half of Parallel in Rapt Parallels, 48.
- XXV—The First M.D. of D.B. in Rapt Parallels, 49.
- XXVI—The Second M.D. of D.B. in Rapt Parallels, 49.
- XXVII—A D.'s in Rapt, Parallels, 51.
- XXVIII—Clockwise and Anticlockwise Distances in Primary Zodiacal Directions, 55.
- XXIX—Shorter Distances in Primary Zodiacal Directions, 55.
- XXX—The First A.E.'s and the Subsequent Ones in Primary Zodiacal Directions, 56.
- XXXI—Limits in Primary Zodiacal Directions, 56.
- XXXII—A D.'s in Primary Zodiacal Directions, 57.
- XXXIII—Moderation of Limit's M.D. in Primary Zodiacal Directions, 57.
- XXXIV—A D.'s in Primary Zodiacal Directions, 60.
- XXXV—Progressed Date 74.
- XXXVI—Progressed Year, 75.
- XXXVII—Ordinal number of year of life, 75.

S

- Scale of the Aspect Extents of Direction, 16
- Schedule I—Speculum of Arcs, 4
- II—Birth C.D.'s Moderated, 21.

S

- III—Shorter Distances, 22.
- IV—Aspect Extents of D.B.'s, 23 to 25.
- V—Appropriate Horizontal Distances, 26
- VI—T.P.L.'s for the Moderation of the Excess of A D., 26
- VII—T.P.L.'s of the Ratio, S.A. C.D., of S.P.'s, 35.
- VIII—Relations between Directions to the two Angles, 36.
- IX—T.P.L.'s of the Ratio, S.A. M.D., of S.P.'s, 44.
- X—Moderated M.D.'s of S.P.'s 45.
- XI—R.A.'s, S.A.'s and M.D.'s, of Bodies, 52.
- XII—S A.'s with T.P.L.'s of bodies taken with no latitude, 61.
- XIII—Shorter Distances in Primary Zodiacal Directions, 62.
- XIV—Limits in Primary Zodiacal Directions, 63.
- XV—Speculum of Limits taken with no latitude, 64.
- XVI—Dates measured to by A D.'s, 72
- XVII—Longitudes of Bodies on Progressed dates, 79.
- XVIII—Declinations of Bodies on Progressed dates, 79.
- XIX—Limits of the Aspect to the Radicals, 82.
- XX—Declinations of the Radicals, 86.
- XXI—Radicals and Aspects, 118.
- XXII—Progressed Bodies and Aspects for the 29th Year, 121 to 122
- XXIII—Progressed Bodies and Aspects for the 45th Year, 124
- XXIV—Progressed Bodies and Aspects for the 46th Year, 126
- XXV—Recapitulation of Directions, 128

## S

Second Anti clockwise M H, 48  
 Second clockwise M H, 48  
 Second M D of D B, 19  
 Secondary Directions, 6, 75 — of the Pro-  
 gressed to the Radicals, 81 — to the  
 Parallels of the Radicals, 85 — of the  
 Progressed to the other Progressed  
 98 — to the Parallels of the other  
 Progressed, 90  
 Shorter Distance, 54 — between D B  
 and S P 14 Rectified, — 15  
 Solar Revolutions or Returns 103 — to  
 the Progressed Sun 103  
 Speculum 3  
 Standard Nativity, 1  
 Stationary Position (S P), 6  
 Synodical Lunation, 100 Current —, 100  
 System, The Radix — 90

## T

Table I — Right Ascensions of every  
 Ecliptic Degree 161 — 165  
 II — Declinations of every Ecliptic  
 Degree 161 — 165

III — Arcs and Difference  
 every Ecliptic Degree, 166  
 — 183

IV Apparent Motion of  
 184 — 187

V — Equation of Time, 188 — 189

VI — Ternary Proportional Log-  
 arithms 190 — 212.

Time, Measurement of —, 8  
 to by an Arc of Direction 83 90.  
 Transits, 115 Conjunction by —, 11  
 Determination of — at a given time, 1  
 Opposition by —, 115  
 Transitted Point, 115  
 Transiting Body, 115

## Y

Year, Progressed —, 71

## Z

Zodiacal Aspects, 3  
 Zodiacal Directions Primary —, 7, 51 —  
 of the Angles and to the Bodies  
 Zodiacal Map 2  
 Zodiacal Positions, of Bodies, 1 — of  
 Cusps of Houses, 1